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FRIDAY, JANUARY 7, 1977

PART VI

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

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MACHINERY AND MACHINE GUARDING

Request for Information on Technical Issues and Notice of Public Meetings

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[29 CFR Part 1910]

[Docket O]

MACHINERY AND MACHINE GUARDING

Request for Information and Notice of Public Meeetings

• *The purpose* of this notice is to solicit comments and information on approaches to revising 29 CFR Part 1910, Subpart O, "Machinery and Machine Guarding," of the OSHA General Industry Standards. This notice does not reflect a decision by OSHA to revise Subpart O in any particular manner. It is a preliminary inquiry as to the merits of various approaches to revising Subpart O. OSHA believes that this public notice and solicitation of comments is the best way to generate informed and useful comments.•

THE NEED FOR REVISION

Under section 6(a) of the Occupational Safety and Health Act of 1970, OSHA was required to adopt existing national consensus standards and established Federal standards unless it determined that a particular standard would not improve safety and health in the workplace. Five months after the Act was passed, OSHA adopted a large group of the standards as mandatory standards under the Act. Because OSHA recognizes the need for obtaining data for use in revising these standards, on April 23, 1976, it published a request for information in the FEDERAL REGISTER calling for comment on approximately fifteen percent of its safety standards (41 FR 17100).

OSHA specifically requested comments on six general issues which had been suggested as problem areas or deficiencies of the current safety standards. The six areas of concern were:

1. How to simplify and clarify the standards.
2. Which standards are not relevant to employee safety.
3. Whether there are gaps in the coverage of the standards which should be closed.
4. Whether performance criteria are more useful than design specifications.
5. Whether standards developed by consensus organizations should be incorporated by reference in the OSHA standards.
6. What methods of achieving safety should be developed, in the face of rapid advances in technology and the creation of new hazards.

This notice addresses issues particular to Subpart O of the safety standards. Subpart O was derived almost entirely from seven American National Standards Institute ("ANSI") machinery standards. Section 1910.212, "General requirements for all machines" was based on the existing Federal standards issued under the Walsh-Healey Act. These ANSI standards cover only seven machinery groups so that many machines have been regulated solely by the provisions of § 1910.212 requiring generally that machines shall be guarded to protect the operator and other employees in the machine area from hazards. For example, printing presses, rolling mills, and saws cutting either metal or plastic are covered only by § 1910.212. Moreover, certain other machinery, such as cranes and air compressors, are covered by other subparts.

THE PRESIDENT'S TASK FORCE ON REVISION OF THE OSHA SAFETY REGULATIONS

On May 7, 1976, the President established a series of task forces to work in close conjunction with selected agencies of the Executive Branch in improving and simplifying their regulations. OSHA was one of the agencies. The mandate of the OSHA Task Force included preparation of the materials for eliciting public comment on the standards of Subpart O (Machinery and Machine Guarding) and development of a suggested new approach for OSHA safety standards using Subpart O as a prototype.

The Co-chairmen of the Task Force were Philip J. Harter, Senior Staff Attorney of the Administrative Conference of the United States and Joseph L. Kirk, Director of the Policy Analysis Staff of the Occupational Safety and Health Administration. Anson Keller, Special Assistant to the Assistant Secretary for OSHA, was the operating director. The Task Force was comprised of government employees, selected by the Co-chairmen, who were loaned by their employing agencies to the Committee on Regulatory Improvement of the Secretary of Labor. Full-time members included safety engineers, lawyers experienced in drafting regulations, and policy analysts:

Paul Kaller, Deputy Director, Bureau of Hearing Counsel, Federal Maritime Commission;
Richard Greene, Office of General Counsel, Federal Energy Administration;
Judith Goldstein, Office of General Counsel, Pension Benefit Guarantee Corporation;
Margaret Weekes, Office of General Counsel, Department of the Treasury;
Lawrence Brill, Office of General Counsel, Department of Commerce;
Catesby Jones, Director of Safety, Naval Sea System Command, Department of the Navy;
Clarance Campbell, Safety Manager, Rock Island Arsenal, Department of the Army;
Coralee Kuhn, Regulatory Policy Analyst, National Bureau of Standards;
Ruth Day, Regulatory Specialist, Office of Administrative Law Judges, Food and Drug Administration;
Diane Menefee, Paralegal Specialist, Office of Commissioner Robinson, Federal Communications Commission;
Gary Geffert, Legal Publications Specialist, Federal Register.

In addition, two members of the OSHA safety staff served part-time, and the Task Force called upon a wide variety of safety experts from the Department of Defense and its safety schools.

The Task Force operated independently of the Department of Labor but reported progress monthly through the Committee on Regulatory Improvement. The Task Force began work on July 1, 1976, and ended its activities on December 27, 1976. The Task Force made a comprehensive review of Subpart O, which included: all the relevant decisions of the Occupational Safety and Health Review Commission; all petitions and variances and OSHA's responses to them; all relevant correspondence with OSHA; views of OSHA safety staff and field compliance staff; and all relevant consensus standards (as well as consultation with the committee members and the officers of the American National Standards Institute which developed most of those standards). The Task Force also read widely in the field of industrial safety from a bibliography prepared by the Library of Congress.

The Task Force developed the approach which is the subject of this notice. The Task Force believes such an approach will improve safety in the workplace while permitting necessary flexibility in meeting the obligations it imposes. The Task Force also believes its approach can undoubtedly be refined through robust comments.

In addition, the Task Force prepared a document comparing the current standards in Subpart O with the ANSI revisions of the standards on which the OSHA regulations are based and indicating key issues which should be addressed in revising the standards. The Task Force believes such an approach would substantially help the public focus on the important issues and would provide OSHA with necessary commentary and information to propose revisions. The Task Force presented that material to OSHA in September, and OSHA, with modifications, presents this document in the accompanying notice, published today at FR Doc. 77-101, 42 FR 1806.

The Task Force approach was reviewed in detail by the policy and standards subgroups of the National Advisory Committee on Occupational Safety and Health ("NACOSH") on October 7 and November 4 and by NACOSH itself on November 18. NACOSH recommended that OSHA publish the approach in an advance notice of proposed rulemaking, but requested that OSHA first investigate the litigation implications of the approach. This issue is discussed below. OSHA agrees that publication of the approach developed by the Task Force is a desirable way to solicit specific comments and information on the revision of Subpart O during the period when OSHA is searching for methodology appropriate to revision of consensus safety standards. The Task Force recommendations represent one possible approach to the revision process.

THE TASK FORCE APPROACH

The approach developed by the Task Force has three parts: general performance/hazard obligations, an illustrated guide on machine guarding, and a regulatory guide containing specification provisions.

The section on general obligations (§ 1910.213) enumerates the hazards which are associated with the use of machinery and requires each employer to use one of several specific methods of safeguarding to protect employees from injury caused by any of the hazards. The

illustrated guide to machine guarding (Appendix A) contains principles and techniques on general approaches that an employer could consult for guidance. The regulatory guide (Appendix B) contains more detailed specification provisions which may be applicable to particular machines and machine groups.

Because certain situations and machines are extraordinarily dangerous, the approach contains § 1910.217 which imposes mandatory specification standards. In these instances, the employer would not be free to select a method of safeguarding, but instead would have to adhere to any specification requirements set forth in the suggested § 1910.217. Because of the relatively narrow scope of these specification provisions, compliance with them would not automatically insure compliance with the broader requirements of suggested § 1910.213 as to that machine. The employer would have to take additional steps to insure that those portions of his operation not covered by the special rules meet suggested § 1910.213. It is anticipated that, if the approach is adopted, certain requirements pertaining to mechanical power presses would be included in § 1910.217.

The general performance/hazard obligations are set forth in several sections. Section 1910.211 defines the purpose and scope, while § 1910.212 lists relevant definitions.

Section 1910.213 defines the employer's duty in terms of protecting against identified hazards associated with the machinery covered by Subpart O. It requires the employer to install, safeguard, operate and maintain all machinery so as to avoid injury or death from the hazards listed in § 1910.214. These hazards are moving parts, flying material, falling material and inherently hazardous material and must be protected against in situations in which exposure would cause immediate rather than eventual harm to the individual.

Section 1910.215 contains a listing and description of the various types of guarding, at least one of which the employer must use in order to protect against the hazards created by his machinery. These methods of safeguarding are: barrier guard; shield; interlock; automatic device; remote control, placement, feeding and ejecting; location; and lockout. Paragraph (h) of this section sets forth secondary methods of safeguarding which may be used alone only when the employer can show that it is impossible to use any of the primary methods. The secondary methods are: awareness barrier or device; special hand-feeding tools or devices; safety blocks; tag-out; and personal protective equipment.

In order to provide guidance to employers with respect to how they can comply with the requirements of § 1910.213, the regulation contains two appendices. Appendix A contains a simplified explanation of the basic principles of guarding, with illustrations of various types of safeguarding devices. Additionally, this Appendix identifies 22 ANSI standards, relevant to machine guarding, which have not been reviewed or adopted by OSHA. These are published solely for informational purposes, and no approval by OSHA of these standards is intended by their inclusion in this Appendix.

Appendix B would contain detailed specification provisions on the types of safeguarding that could be used for various machine groups (such as abrasive wheels, mills and calenders, or mechanical power presses). It is anticipated that Appendix B will contain revisions of the existing OSHA standards on machine guarding. It is further expected that, if the approach set forth herein is adopted by OSHA, upon completion of appropriate rulemaking procedures, future Appendix B material would be based on other applicable national consensus standards as well as any other material that OSHA determines is appropriate, such as specification provisions developed by OSHA itself.

Compliance with either or both of the appendices would not be required; they are intended merely to serve as guidelines. However, for employers who desire certainty that they are in compliance with § 1910.213, the approach proposes a rule of presumptive compliance. As set forth in § 1910.216, if an employer chooses to comply with all of the requirements contained in Appendix B relating to a particular machine, he will be presumed to be complying with the requirements of § 1910.213, with respect to that machine, absent unusual conditions or circumstances in his workplace that would require additional or different safety practices from those specified in Appendix B. This concept of presumptive compliance seems appropriate because OSHA has reviewed and approved all of the material in Appendix B.

It must be stressed that the rule of presumptive compliance is only applicable in "ordinary" work situations. Unusual circumstances in the employer's workplace, such as the use of a machine for a purpose other than that for which it is generally intended, may defeat the presumption. Under the approach, OSHA would then determine whether the machine complies with § 1910.213.

AN EXAMPLE

Under the suggested approach, an employer could fulfill his obligations with respect to a machine in one of two ways. He could decide to follow all the applicable provisions in Appendix B, but he would first have to ensure that the machine is not used in unusual circumstances. Or, if the employer elects not to follow these provisions or if there are none applicable to his machine, the employer must analyze the machine to determine if it creates any of the enumerated hazards. If it does, then the employer must use at least one of the acceptable methods of safeguarding to protect the employees from the hazards.

Similarly, when making an inspection a compliance officer would assess each machine to determine if an employee is exposed to an enumerated hazard. If an employee was so exposed and an acceptable method of safeguarding was not used or applicable specification provisions were not followed, then the employer would be in violation of the regulation.

Under the suggested revision of Subpart O, OSHA would have the following burden of proof in sustaining a contested citation: (1) The presence of an enumerated hazard which may cause traumatic injury or death; (2) the absence of any of the listed methods of safeguarding or, where guarding is in use, its inadequacy to protect the employee from the hazard; (3) exposure of employees, such as the machine operator or other employees who have access to the point of hazard. The cited employer could, in turn, interpose any of the following defenses: (1) A factual defense rebutting the hazard on the grounds that it is de minimis, the adequacy of the method of safeguarding used, or the lack of exposure of employees; (2) compliance with all applicable provisions in Appendix B thereby creating a presumption of compliance and shifting the burden of proving unusual circumstances necessitating additional guarding to the Secretary; (3) compliance with all of the primary methods of safeguarding is impossible and that an appropriate secondary method is in use.

Issues Raised by the Task Force Approach

BREADTH OF COVERAGE

Currently, some have suggested that, because Subpart O does not explicitly state the extent of its coverage, there is some confusion as to which standards apply to particular machines. The approach makes explicit that it imposes a consistent performance-type standard which applies uniformly to all machines, regardless of function, unless they are specifically exempted from it.

OSHA solicits comment on whether this broad coverage would clarify the obligations, and whether there are additional machines or machine types which should be exempted because, for example, they are covered by other OSHA standards or the hazards presented are different from those enumerated.

COMBINATION OF PERFORMANCE AND SPECIFICATION STANDARDS

The April 23, 1976 notice pointed out that one of the major issues of the revision process is whether to use "performance" or "specification" standards. It is important to note that there are no commonly agreed to definitions of "performance" or "specification" standards. Rather there is a spectrum of obligations from the most general (section 5(a)(1) of the Act—workplace free from recognized hazards) to the most specific (rivets 5 inches apart).

Unlike a design standard which dictates how a machine must be constructed and operated, a performance standard states obligations in terms of ultimate goals which must be achieved. The employer is then free to achieve those goals through any appropriate means.

A large number of employers appear to favor the adoption of a performance

approach. These employers argue that the specification-type standard is unduly rigid, inhibits the development and use of new technology, and is often so complicated that many employers and employees cannot understand the standards. On the other hand, a significant number of employers have expressed concern that under a performance standard they would lack sufficient guidance to know exactly what they must do in order to comply with the regulations. Similarly, some employees have suggested that performance standards may not adequately inform them about what obligations are imposed on their concerns. A question has also arisen as to the degree to which a performance approach might impose greater burdens on OSHA compliance officers. The new approach embodies a performance standard, but also provides specific information in the appendices to the regulation to assist employers and employees in understanding how to safeguard in certain situations.

The approach sets forth a list of hazards and a list of acceptable safeguarding methods against which compliance can be tested: does a hazard exist, is an employee exposed, is an appropriate method of safeguarding used so that no employee is exposed? Hazards which could cause traumatic injury or death must be safeguarded. If no hazard is present, no safeguarding is necessary.

OSHA specifically solicits comment as to whether the obligations of the approach are sufficiently clear so that employers can readily determine what is required of them and that employees can more easily determine whether a safe workplace is being provided.

DEFINITION OF TRAUMATIC INJURY

Traumatic injury or death is defined by the model approach as bodily injury or death produced by any physical contact including contact with any thermal, chemical, or other agent capable of burning, corroding or otherwise causing bodily harm. This definition would be applicable only to those hazards which threaten an employee's safety, generally not to health hazards. OSHA solicits specific comments on the need for this distinctoni and on ways in which the definition can be clarified.

Comments are also invited on whether and how to exclude from coverage minor or insignificant injuries, and on the consistency of the above definition with those used in the OSHA statistical programs and in the worker's compensation program.

COMPREHENSIVENESS OF LIST OF HAZARDS

The suggested approach has attempted to catalog all of the hazards associated with the use of machinery, other than electrical hazards (covered under Subpart S) and those associated with hazardous materials (Subpart H) and toxic and hazardous substances (Subpart Z). Specific suggestions regarding additions to the list of hazards (§ 1910.214) and on ways in which the list can be improved are solicited. Comments are also invited on how to deal with new or unusual hazards.

COMPREHENSIVENESS OF METHODS OF SAFEGUARDING

The suggested approach has attempted to catalog all of the methods of safeguarding which effectively protect employees from hazards. Some are characterized as secondary methods of safeguarding, which can be used alone only if the employer can show that it is impossible to use any of the primary methods. OSHA solicits comments on the clarity of the definitions of the various methods (§ 1910.215), on whether additional primary or secondary methods of safeguarding should be included, and on whether the classification of the methods is appropriate.

Comment is also invited on the difficulty employers might encounter in matching safeguarding methods to hazards, and on whether the ability of an employer to use a secondary method inhibits his incentive to redesign his machine or use another machine in order to accomplish the same operation in a manner which permits use of a primary method of safeguarding. Finally, comment is invited on the likelihood that entirely new methods of safeguarding, not now included on the approved list, would be developed and on the problems that temporary exclusion of such methods, prior to rulemaking, might cause.

POSSIBLE VARIATIONS OF THE APPROACH

Two variations of the approach arose during the discussions by NACOSH. They are presented here for public comment.

VARIATION 1

This variation would require the employer to comply with all the requirements of the suggested approach described above and would make mandatory compliance with the specification standards in Appendix B. Compliance under this variation would involve a two-pronged process. An employer would have to comply both with the requirements of suggested § 1910.213 and also with all applicable specification standards. In effect, this variation would replace the existing § 1910.212 with the suggested approach.

Some have suggested that by requiring compliance with specification standards and by clarifying the performance standard, Variation 1 could lead to a higher level of workplace safety. Adopting this variation would raise the same objections discussed above with regard to specification standards. Another difficulty is that, because of the gaps of coverage in the specification standards, similar hazards would be subject to different guarding requirements. OSHA solicits comments on the merits of this variation.

VARIATION 2

The second variation would use the suggested approach including the specifications guidelines (Appendix B) but would also include a provision requiring an employer to follow the specification provision unless he could prove he has complied with the general requirements of suggested § 1910.213. Under Variation 2, OSHA would need only to prove, as now with regard to the specification standards of §§ 1910.213 to 1910.219, that an employer is not complying with a specification provision and that the employee was exposed to a hazard; and if an employer chooses to deviate from an applicable specification standard, he would have to prove that either the machine did not create a hazard or, if it did, that the hazard was adequately safeguarded. This would be the reverse of the burden of proof under the approach in which OSHA would have to prove the existence of a hazard in the workplace and the failure of the employer to adequately safeguard the hazard.

For example, under the approach if a citation were issued for failure to protect against the hazard of flying material on an abrasive wheel machine, OSHA would have to demonstrate that the flying material constituted a hazard to employees and that the employer had failed to use an effective method of safeguarding to protect against this hazard. On the other hand, under Variation 2, if the employer did not follow Appendix B, he would be presumed initially not to be in compliance with the regulation, and he would have to prove either that no hazard existed from the flying materials or that he had utilized an adequate safeguard to protect against the hazard. However, if the employer followed Appendix B, he would be presumed in compliance and OSHA would have to sustain the burden of proving that unusual circumstances existed in the employer's workplace which made the safeguarding method inadequate to protect against the hazard.

A potential advantage of this variation is that it may provide for easier enforceability by OSHA. However, current Subpart O does not contain specification standards for all types of machines. Since the burden of proof would be shifted only for those relatively limited numbers of machines for which specification standards exist, under Variation 2, the burden would be the same, absent a specification standard, as that under the suggested approach or under the current § 1910.212.

A potential difficulty is that it may be difficult to prove the non-existence of a hazard. In addition, this variation would tend to stress reliance upon technical specification standards.

Issues Regarding Mandatory Requirements

The suggested approach proposes some new mandatory requirements for employers and several others were considered. These are presented in this section to facilitate public comment on their usefulness in improving workplace safety. Some of these issues are further discussed in the accompanying notice, published today at 42 FR 1806.

TRAINING

The suggested approach would impose a requirement that each employee be instructed on the hazards created by the machines he will be using or their opera-

tion and that he be educated on the safe use, care and inspection of those machines before he begins to operate them. It further requires that the employee be aadequately supervised to ensure the safe operation of the machines.

The suggested approach does not specify the extent or nature of training or supervision which it would require. OSHA solicits comment on whether it is necessary to make the requirements more specific and, if so, what specific obligations should be imposed.

MAINTENANCE AND INSPECTION

The suggested approach would impose a requirement that machines be inspected and maintained to ensure their safe operating condition. OSHA requests comments on whether it is feasible for OSHA to establish the parameters of the required inspection and maintenance program and what those parameters should be; or whether, because of the diverse types of machinery covered and because of the varying utilization of machinery, it is only practicable to require that each employer adopt a program that is reasonable in the context of his particular operations. OSHA also requests comments on whether a specific definition of maintenance should be included in the standard, and, if so, what it should be.

LOCKOUT AND TAGOUT

Some have suggested that tagout procedures are acceptable alternatives to lockout procedures and should not therefore be classified as a secondary method of safeguarding. Others say that they are not acceptable at all. OSHA requests comments on whether tagout procedures should be acceptable as a primary method of safeguarding, and on whether tagout procedures provide an adequate level of safety to be included even as a secondary method.

RECORDKEEPING

Some have suggested that the Task Force approach should require records of maintenance and inspection activity to be kept. They believe that the mere act of recordkeeping will focus attention on the need for these activities, which will in turn improve workplace safety. Others have suggested that recordkeeping would impose an unnecessary and substantial burden. OSHA requests comments on the effectiveness, burden, and retention period of such a recordkeeping requirement.

MACHINE CONTROLS

Some have suggested the inclusion of a separate section on machine controls which would require that controls: Be clearly marked as to function, be designed for operation without exposing an employee to a hazard, and be designed to prevent inadvertent operation. Others are of the view that all of these requirements are encompassed within the current language of the model approach in all those instances where an employee would be exposed to a hazard caused by deficient machine controls. OSHA requests comment on whether a separate section containing detailed machine control requirements is necessary or whether it is clear that such requirements are imposed by the suggested approach.

SPECIAL RULES

The suggested approach contains a § 1910.217 which would impose mandatory specification standards which must be followed. These mandatory standards would be imposed only for those machines or machine operations which are particularly dangerous, when little discretion as to how to safeguard the hazard can be provided. OSHA invites comments on what types of machines and machine operations should be included in this mandatory section, and what criteria should be used to make such determinations.

PUBLIC PARTICIPATION

As discussed above the purpose of this notice is to gather as much relevant data and comments as possible from as many interested persons as possible. Public participation in this information gathering process is critical to its success. All persons concerned with these regulations, including employees who are protected by them, employers who must comply with them, experts in machine guarding, elected representatives and members of the public at large, are urged to participate in this process.

You are invited to submit written comments on the issues raised in this notice or on any other aspects of the regulations concerning machine guarding. Comments are solicited on the existing standards of Subpart O, raised in the accompanying detailed three-column presentation, as well as on the suggestions, comments, and other matters discussed in this document. Any additional recommendations pertaining to the subject matter of Subpart O are equally welcome, and will materially assist OSHA in making determinations with respect to a possible subsequent proposal.

These comments should be in the form not only of agreement or disagreement with the issues set forth, but should include alternatives, data (including injury data) to support recommendations, reasons and rationale for positions, and issues not raised herein.

Written comments should be submitted on or before April 7, 1977 and should be sent to Docket O, Technical Data Center, Room N3620, U.S. Department of Labor, 200 Constitution Ave., N.W., Washington, D.C. 20210. Written submission should clearly identify the standards or sections addressed and the position taken. The data, views, and information submitted will be available for public inspection and copying at the above address.

Everyone interested in commenting, employees, employers, manufacturers, and others with data, are urged to submit their comments and information in writing. In addition to this request for written submissions, OSHA is scheduling several public meetings at various locations around the country to afford the public the widest possible opportunity to submit their data and views. The meetings will be held on the dates and at the locations listed below:

Dates: March 1–3, 1977:
Atlanta—Gulf Oil Building, Room 185, 1375 Peachtree Street, N.E.
Boston—Hilton Hotel, Logan Airport.
Cleveland—Cleveland Holiday Inn, 1111 Lakeside.
Dates: March 8–10, 1977:
Chicago—Sheraton O'Hare, 6810 N. Mannheim Road.
Dallas—Baker Hotel, The Texas Room, 1400 Commerce Street.
Denver—Stouffers Denver Inn, 3203 Quebec St.
Dates: March 15–17, 1977:
Los Angeles—Biltmore Hotel, Roman Room, 515 So. Olvie St.
Winston-Salem—Benton Convention Center, Conference Rooms Nos. 6 & 7, 301 West 5th St.
Dates: March 22–24, 1977:
Kansas City—Philip House, The London Room, 12th and Baltimore.
New York—U.S. Department of Labor, Room 3560, 35th Floor, 1515 Broadway.
Seattle—Edgewater Inn, 2411 Alaskan Way.

Each meeting will begin prompty at 10 a.m., will recess from 12 noon until 2 p.m., and will continue until 5 p.m. Although OSHA has scheduled evening sessions for public meetings of this sort in the past, participation in such sessions was very limited. However, OSHA will either extend the evening schedule or schedule a separate night meeting, if a sufficient number of requests are received to warrant such action. The meetings are intended as a forum for the public to orally submit information concerning issues raised by this notice and any others concerning machine guarding. The chairperson of each meeting will be a representative of the Department of Labor designated by the Assistant Secretary for Occupational Safety and Health, and will have all necessary authority to regulate the conduct of the meetings.

In order to reasonably anticipate the response at each meeting location, OSHA requests that any person wishing to make an oral presentation notify OSHA by advance written notice. The notice should identify the person and/or organization intending to testify, the amount of time requested for oral presentation, and the subject matter and a brief summary of the intended oral presentation, if possible. Such written notice of a desire to make an oral presentation should be sent to Docket O, Technical Data Center, Room N3620, U.S. Department of Labor, 200 Constitution Ave., N.W., Washington, D.C. 20210, no later than two weeks before the scheduled meeting date. All persons giving advance notice by mail will have time reserved for oral presentation. Persons wishing to testify, who have not submitted advance notice, are requested to register for each meeting at the place and on the day scheduled, from 9 a.m. to 10 a.m.

As long as time permits, all persons who wish to be heard will be allowed to make oral presentations. However, should time restraints so require, priority will be made for OSHA's use in resolving vance.

A written transcript of these meetings will be made for OSHA's use in resolving the various issues raised by these proceedings. Copies of the transcripts will be available for inspection at the Technical Data Center, U.S. Department of Labor, Room N3620, 200 Constitution Avenue, N.W., Washington, D.C. 20210.

Following completion of the meetings and expiration of the comment period, OSHA will review all the information, arguments, views, and data collected as well as any other relevant data. If appropriate, OSHA will develop a proposal to amend the existing standards and will initiate rulemaking proceedings under section 6(b) of the Act. In the event that a new proposal is issued, all the information gathered will become part of the public record in that proceeding.

Signed at Washington, D.C., this 27th day of December 1976.

MORTON CORN,
Assistant Secretary of Labor.

PART 1910—MACHINERY AND MACHINE GUARDING

Subpart O—Machinery and Machine Safeguarding

Sec.

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1910.214 Hazards of machines.
1910.215 Methods of safeguarding the point of hazards.
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1910.217 Special rules.
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Subpart O—Machinery and Machine Safeguarding

§ 1910.211 Purpose and scope.

(a) *Purpose.* The purpose of this Subpart is to set forth mandatory performance criteria for protecting against those hazards which are associated with operation of machinery and which may cause traumatic injury or death and to provide methods for safeguarding against such hazards. In addition to these mandatory requirements, certain specifications and diagrams intended as guidelines for compliance are provided in the Appendices to this Subpart.

(b) *Scope.* (1) This subpart applies to all machinery except as provided in paragraph (b)(2) of this section. Examples of machinery subject to this Subpart are:

(i) *Sawing, boring, and finishing machinery*

Power-driven saws	Sanding machines
Cooperage machinery	Grinding and abrasive wheel machines
Milling machines	Wirebrush machines
Polishing and buffing machines	
Drilling and boring machines	

(ii) *Cutting and shaping machinery*

Lathes	Tenoning machines
Turning machines	Planing machines
Shapers	Routers
Jointers	

(iii) *Machines for farm and cold forming of materials*

Mechanical power presses	Punches
Hydraulic presses	Pneumatic presses
Compactors	Iron workers
Balers	Extruders
Shears	Headers
	Rollers

(iv) *Machines for hot forming materials*

Forging hammers	Upsetters
Presses	Extruders
Rollers	Shears
Die casting machines	Molding machines

(v) *Other*

Belts, chains, pulleys, sprockets and similar apparatus
Roller mills and calendars
Ball mills, crushers, and similar machines
Rivet setting equipment and similar fastening machines
Folding, crimping, scoring, and similar machines
Packaging and canning machines
Stationary refuse collection equipment
Sewing, stitching and similar machines
Mixers

(2) This Subpart does not apply to the following:

(i) Machinery subject to Subparts F, M, N, P, Q, and R of this Part; and

(ii) Vehicular equipment.

§ 1910.212 Definitions.

For purposes of this Subpart:

"Cutting and shaping machines" means any power driven equipment used to shape or form materials by means of mechanical or electrical cutting. Mechanical presses are excluded from this definition and are included under machines for warm or cold forming materials.

"Hand-feeding tool" means any handheld device used to insert, manipulate, or remove the workpiece.

"Machine for warm or cold forming material" means any power driven equipment used to shape or cut material at ambient temperatures of less than 149° F (65° C) through impact or pressure forces.

"Machine for hot forming material" means any equipment used in the process of cutting or shaping materials at 149° F (65° C) or higher by melting and molding or by impact or pressure forces.

"Point of hazard" means that zone or area of or near any machine, machine part, or workpiece—including the point of operation—which, if entered or contacted by an employee, may subject the employee to danger or traumatic injury or death.

Machine motions or actions which are commonly recognized as possibly subjecting an employee to such hazards include:

1. Rotating, reciprocating, and transverse motions;
2. In-running nip points;
3. Cutting actions; and
4. Pressing, punching, shearing, and bending actions.

Machinery at rest which may subject an employee to a danger of traumatic injury include the cutting edge of saws or shears, hot dies, elevated tools subject to release, and pressurized systems.

"Point of operation" means that point where the workpiece is positioned, and work such as drilling, milling, boring, shearing, cutting, punching or grinding is performed upon the workpiece during the production process.

"Presence-sensing device" means a device which creates a sensing field or area and initiates action to stop the machine when a hand or other body part enters the sensing field or area.

"Sawing, Boring or Finishing Machine" means any power-driven equipment used to bore, drill, or change the shape or size of a piece of wood, plastic, metal or other material, or to finish a piece of wood, plastic, metal or other material by sanding, grinding, buffing or similar operations.

"Traumatic injury or death" means bodily injury or death produced by any physical contact, including contact with any thermal, chemical or other agent capable of burning, corroding or otherwise causing bodily harm.

"Two-hand control" means a machine actuating device requiring concurrent use of both hands of the operator(s) and continued concurrent pressure from both hands (or pairs of hands) during that part of the machine running cycle in which a hazard exists.

"Two-hand trip" means a machine actuating device requiring concurrent use of both hands of the operator to trip or initiate a machine cycle.

"Workpiece" means the material to be processed.

§ 1910.213 General requirements.

(a) *Protection against hazards.* Each employer shall install, safeguard, operate and maintain at all times all machinery subject to this Subpart in a manner which protects all employees from traumatic injury or death resulting from the hazards enumerated in § 1910.214. One or more of the methods of safeguarding described in § 1910.215 shall be used to protect employees against the hazards enumerated in § 1910.214.

(b) *Employee training and supervision.* Each employer shall establish a training program for operators, inspectors, and maintenance personnel for the purpose of instructing and training them in the hazards presented by and the safe use, care and inspection of their machines before they begin operation on a machine. Each employer shall also provide adequate supervision of employees so that safe operating, set-up and maintenance procedures are followed.

(c) *Machine inspection.* Each employer shall establish a program for the periodic and regular inspection of machinery subject to this Subpart so that all parts, auxiliary equipment, and safeguards are in a safe operating condition. Maintenance or repair, or both, necessary to provide a safe operating condition shall be performed and completed before the machines are operated.

§ 1910.214 Hazards of machines.

The following are hazards which must be protected against in accordance with § 1910.213, where physical

contact with them may cause traumatic injury or death.

(a) *Moving parts*—rotating, reciprocating, in-running, cutting, punching, shearing, sawing, bending, or any other moving machine parts, actions, accessories, workpieces, or mechanical power transmission apparatus.

(b) *Flying material*—flying chips, sparks, workpieces, workpiece fragments, or fragments of machine parts or accessories, substances in a vacuum or under pressure, constraint or tension which may be released in an uncontrolled way.

(c) *Falling material*—elevated workpieces, machine parts or accessories.

(d) *Inherently hazardous material*—sharp or pointed machine parts or workpieces, extremely hot or cold machine parts or workpieces, or highly reactive, flammable or caustic workpieces or substances used in machine operations.

§ 1910.215 Methods of safeguarding the point of hazard.

Methods are classified into two groups: primary methods (paragraphs (a) through (g)), any of which may be used to protect employees against hazards, and secondary methods (paragraph (h)) which may be used alone only if it is impossible to use any of the primary methods.

(a) *Safeguarding by barrier guard.* Safeguarding by barrier guard is accomplished when the machinery is equipped with an enclosure which prevents hands, fingers, or other parts of the employee's body from reaching through, over, under, or around the enclosure into the point of hazard.

(b) *Safeguarding by shield.* Safeguarding by shield is accomplished when machinery is equipped with a fixture which prevents chips, sparks, coolants, fluids, hazardous materials, workpieces, workpiece fragments or fragments of machine parts or accessories from flying out in the direction of the operator or other employees.

(c) *Safeguarding by interlock.* Safeguarding by interlock is accomplished when machinery is equipped with a device which:

(1) Prevents or immediately stops all motion at the point of hazard whenever any employee opens or removes an enclosure, barrier, or shield or whenever any part of an employee's body comes in contact with a bar, rod, or wire, or interrupts a photo-electric beam, magnetic or electrical field, or a pressure sensor or similar presence sensing device; and

(2) Prevents the resumption of motion at the point of hazard until some deliberate action is taken to reset the machinery or equipment.

(d) *Safeguarding by automatic device.* Safeguarding by automatic device is accomplished when machinery is equipped with a device which, through a system of linkages connected to the operating mechanism, pushes or pulls an operator, or any part of his body, away from a point of hazard.

(e) *Safeguarding by remote control, placement, feeding, and ejecting.*

(1) *Two-hand trip.* Safeguarding by two-hand trip is accomplished when:

(i) Concurrent pressure of both hands on the actuating device is necessary to initiate or trip the machine;

(ii) The actuating device is a sufficient distance from the point of hazard to prevent the operator's hands from entering the point of operation while the hazard exists; and

(iii) If more than one employee is exposed to the hazard additional two-hand trips are installed so that all employees must activate the starting mechanism concurrently.

(2) *Two-hand control.* Safeguarding by two-hand control is accomplished when the requirements of paragraph (e)(1) of this section are met and the machine brake, power disconnect, and/or clutch systems are adjusted to stop all machine motion if any of the controls are released prior to the cessation of the hazard and the machine is adjusted to prevent resumption of motion until the machine has been reset.

(3) *Automatic or semi-automatic feed, stripping or removal.* Safeguarding by automatic or semi-automatic feed, stripping, ejection, or removal, is accomplished when the workpiece or material is fed into the machine by chutes, hoppers, conveyors, movable dies, dial feed rolls, strippers, or other similar devices, and barrier guards prevent entry into the point of hazard or shields prevent exposure to flying material.

(f) *Safeguarding by location.* Safeguarding by location is accomplished when any of the following conditions exist:

(1) The machinery is located so as to protect against inadvertent contact with or entry into a point of hazard;

(2) The machinery is located in an enclosed area and employees are prevented from entering or having access to the machinery when the machinery is operating and the machine controls have lockout capability;

(3) The operator controls the operation from an enclosure which protects against inadvertent contact with, or entry into, a point of hazard, and the machine controls have lockout capability. Additional safeguards are required if other employees may be exposed to the point of hazard.

(g) *Safeguarding by lockout.* Safeguarding by lockout is accomplished when all motion in the point of hazard, whether caused by a power source or gravity, is physically prevented from restarting and any inherently hazardous material is expelled from the point of hazard and its further release is physically prevented.

(h) *Secondary safeguarding.* The following safeguards may be used alone only when the employer can establish that it is impossible to use any of the methods of safeguarding set forth in paragraphs (a) through (g) of this section.

(1) *Secondary safeguarding by awareness barrier or device.* Safeguarding by awareness barrier or device is accomplished when machinery is equipped with an enclosure or audio or visual device that warns an employee that he is approaching a point of hazard.

(2) *Secondary safeguarding by special hand-feeding tools or devices.* Safeguarding by special hand-feeding tools or devices is accomplished when specially designed hand-feeding tools for placing material into, manipulating, or removing material from the point of hazard are utilized.

(3) *Secondary safeguarding by safety blocks.* Safeguarding by the use of safety blocks is accomplished when blocks are manually or mechanically placed into the point of hazard or prevent machine movement.

(4) *Secondary safeguarding by tag out.* Safeguarding by tag out is accomplished when warning tags are placed on machine controls clearly indicating that machinery is not to be operated.

(5) *Secondary safeguarding by personal protective equipment.* Safeguarding by personal protective equipment is accomplished when the requirements of Subpart I of this Part are complied with.

§ 1910.216 Rules for compliance.

(a) In order to comply with § 1910.213(a), each employer shall determine the appropriate methods of safeguarding from § 1910.215 to use in protecting against the hazards listed in § 1910.214. Appendices A and B to this Subpart are set forth in order to provide employers with guidance in meeting the requirements of § 1910.213(a). If an employer chooses to follow all the applicable specification provisions contained in Appendix B, he shall be presumed to be in compliance with § 1910.213(a), except where unusual circumstances or conditions exist in his workplace which require additional or more stringent protection of employees.

(b) In addition to the requirements of paragraph (a) of this section, the special rules of § 1910.217 are mandatory requirements which must be met by all employers to whom the particular requirements apply.

§ 1910.217 Special rules. [Reserved]

APPENDIX A

PRINCIPLES AND TECHNIQUES OF MACHINE SAFEGUARDING

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I. ACTIONS AND MOTIONS THAT CREATE HAZARDS

Since safety standards cannot be drawn which will cover every conceivable hazardous mechanical exposure, it is often necessary to use imagination and ingenuity to protect unusual situations. If the basic hazardous actions and motions are understood, it is easier to evaluate the hazard and to develop effective control measures, whatever the machine. Actions or motions involving the most hazardous exposures may be classified as:

Rotating, Reciprocating, and Transverse Motions.
In-Running Nip Points.
Cutting Actions.
Punching, Shearing, and Bending Actions.

A discussion of these actions or motions, along with typical illustrations of each, follows:

Rotating, Reciprocating, and Transverse Motions

Rotating, reciprocating, and transverse motions create hazards in two general areas—at the point-of-operation where work is being done, and at the points where power or motion is being transmitted from one part of a mechanical linkage to another. Since guarding at the point-of-operation will be discussed under the other classifications of action or motion, this section will be devoted primarily to situations where power is being transmitted or the point-of-operation is not clearly defined (extractors, mixers, etc.).

Any rotating object is dangerous. Even smooth, slowly rotating shafts can grip clothing or hair, and through mere skin contact force an arm or hand into a dangerous position. Accidents due to contact with rotating objects are not frequent, but the severity of injury is always high.

Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, rotating bar stock, lead screws, and horizontal or vertical shafting are typical examples of common rotating mechanisms which are hazardous. The danger increases when bolts, oil cups, nicks, abrasions, and projecting keys or screw threads are exposed when rotating.

Rotating.

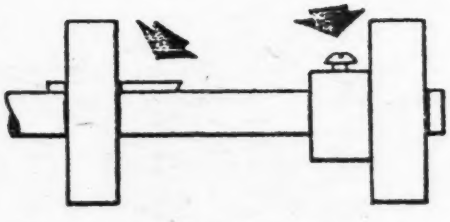
In many cases, the rotating mechanism is located within a stationary case or shell and consists of a revolving cylinder, a screw, agitator blades, or paddles. Washing machines, extractors, raw material mixers, and screw conveyors are typical examples of this type of hazardous rotating mechanism.

Reciprocating and transverse motions are hazardous because, in the back and forth or straight line action, a worker may be struck or caught in a pinch or shear point between a fixed or other moving object.

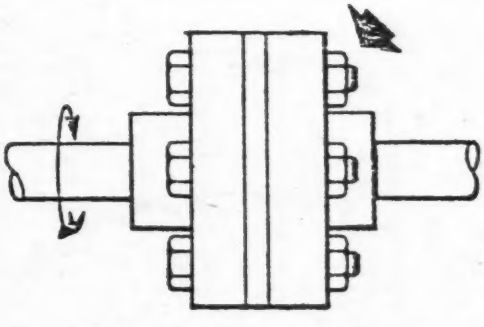
Transverse (in straight line).

Reciprocating.

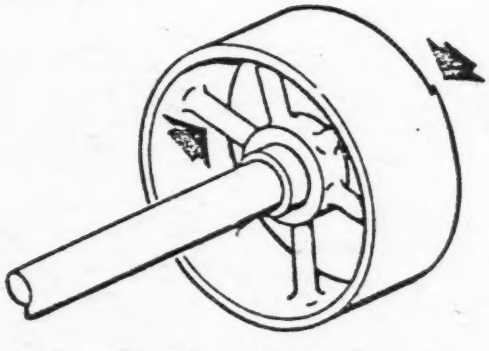
Examples of Typical Rotating, Reciprocating, and Transverse Mechanisms



Rotating shaft and pulleys with projecting key and set screw.

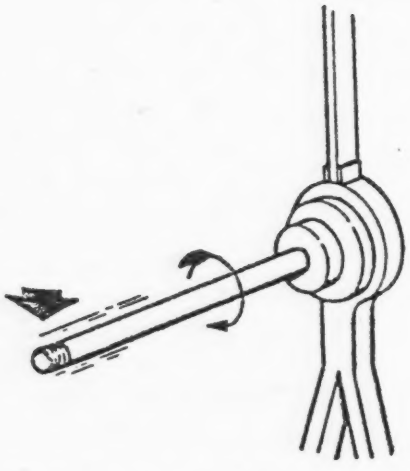


Rotating coupling with projecting bolt heads.

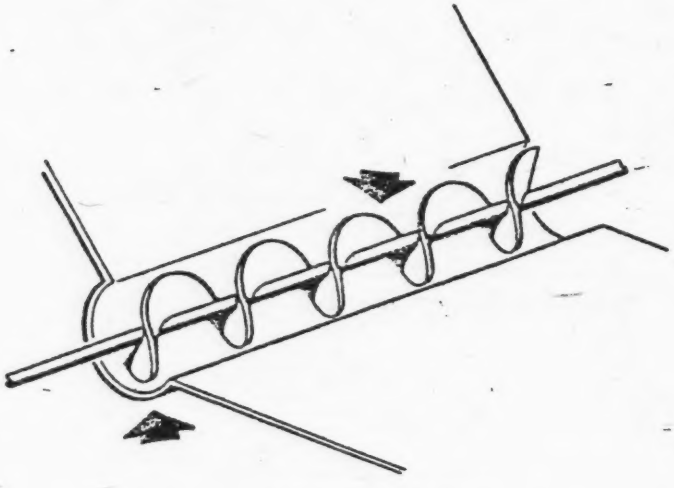


Rotating pulley with spokes and projecting burr on face of pulley.

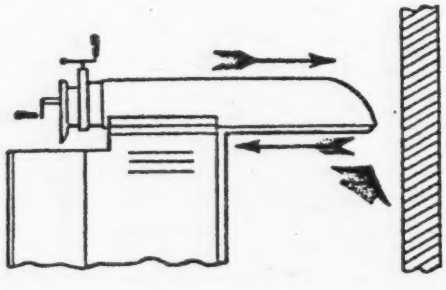
Examples of Typical Rotating, Reciprocating, and Transverse Mechanisms



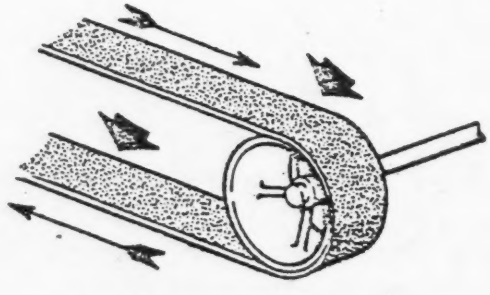
Rotating bar stock at end of screw machine.



Rotating screw conveyor.



Reciprocating action of machine creating pinch point at fixed object.

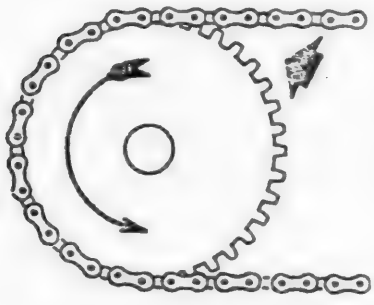


Transverse motion of belt and rotating pulley.

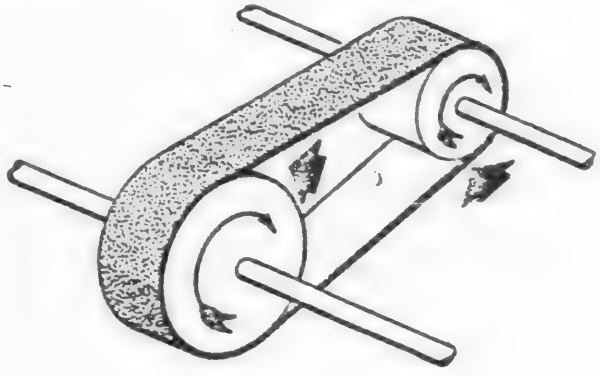
In-Running Nip Points

In-running nip points are a special danger existing only through action of rotating objects. Whenever machine parts rotate toward each other, or where one rotates toward a stationary object, an in-running nip point is formed. Objects or parts of the body may be drawn into this nip point and be bruised or crushed.

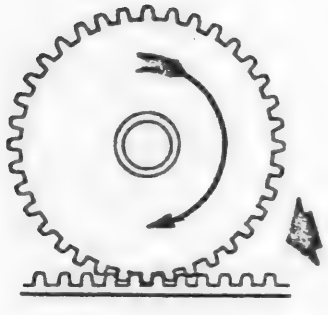
The in-running side of rolling mills and calenders, of rolls used for bending, printing, corrugating, embossing or feeding and conveying stock, the in-running side of a chain and sprocket, belt and pulley, a gear rack, a gear and pinion, and a belt conveyor terminal are typical examples of nip point hazards.



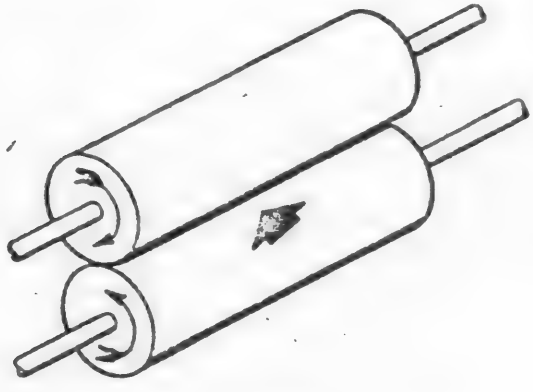
Chain and sprocket.



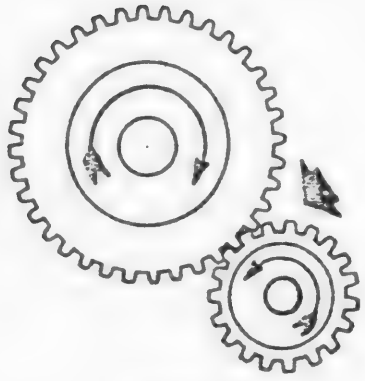
Belt and pulley.



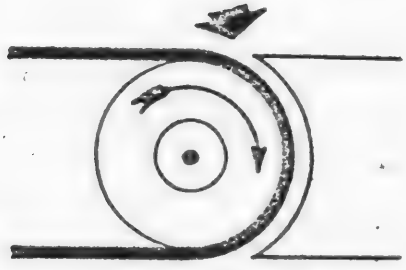
Rack and gear.



Pressure rolls.



Gear train.



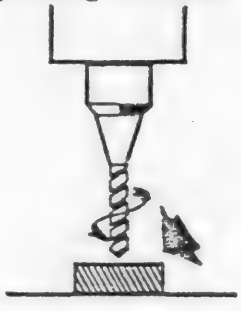
Conveyor terminal.

Cutting Actions

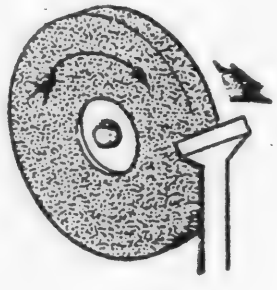
Cutting action results when rotating, reciprocating, or transverse motion is imparted to a tool so that material being removed is in the form of chips. The danger of cutting action exists at the movable cutting edge of the machine as it approaches or comes in contact with the material being cut. Such action takes place at the point-of-operation in cutting wood, metal, or other materials as differentiated from punching, shearing, or bending by press action.

Typical examples of mechanisms involving cutting action include band and circular saws, milling machines, planing or shaping machines, turning machines, boring or drilling machines, and grinding machines.

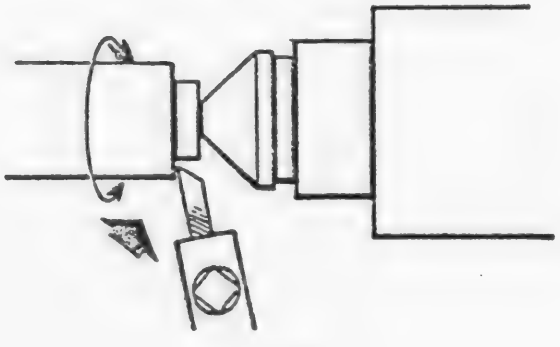
Circular saw.



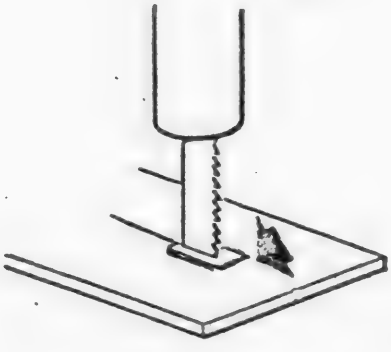
Drill.



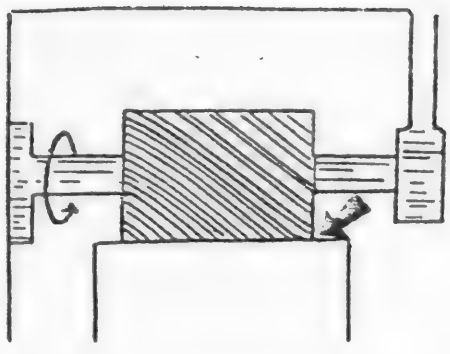
Abrasive wheel.



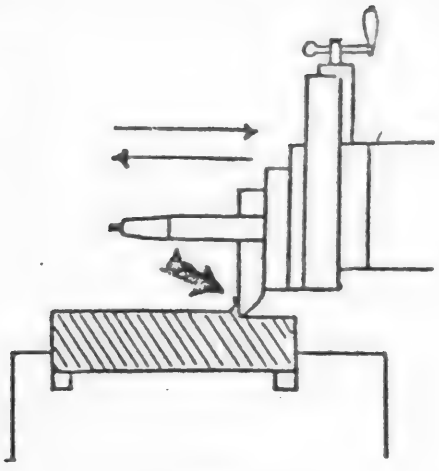
Engine lathe.



Band saw.



Milling machine.

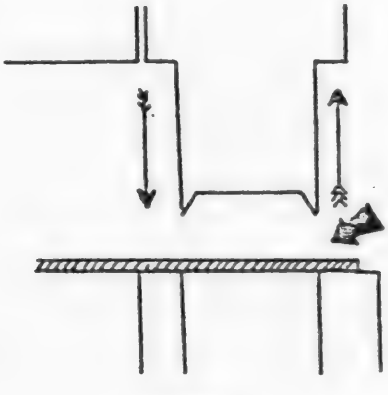


Shaper.

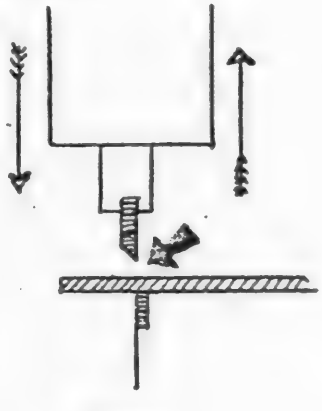
Punching, Shearing, and Bending Actions

Punching, shearing, or bending action results when power is applied to a ram (plunger) or knife for the purpose of blanking, trimming, drawing, punching, shearing, or stamping metal or other materials as differentiated from removing the material in the form of chips. The danger of this type of action lies at the point-of-operation where stock is actually inserted, maintained, and withdrawn.

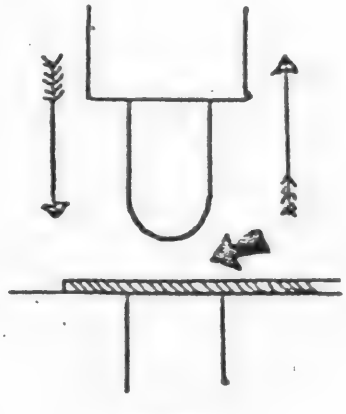
Typical examples of equipment involving punching, shearing, or bending action include power presses, foot and hand presses, bending presses or brakes as well as squaring, guillotine, and alligator shears.



Punching.



Shearing.



Bending.

II. SUMMARY OF SAFEGUARDING METHODS

Methods of guarding actions and motions cited in §1910.214 are addressed in the following tables detailing the functions and actions of the various guarding methods with limitations which may be applicable to a particular safeguarding method:

Methods of Guarding Actions and Motions—Enclosure Guards

Guarding methods	Guard action
Fixed enclosure	Barrier or enclosure which admits the stock but which will not admit hands into danger zone because of feed opening size, remote location, or unusual shape. Also used to completely enclose power transmission apparatus. Used to contain bursting machine parts.
Adjustable enclosure	Barrier or enclosure which is adjusted to fit around different sizes or shapes of the die. When adjusted, provides same protection as fixed enclosure.

Methods of Guarding Actions and Motions—Interlocking Guards

Guarding methods	Guard action
Enclosure with electrical or mechanical interlock.	Enclosure or barrier shuts off or disengages power and prevents starting of machine when guard is open; prevents opening of the guard while machine is under power or coasting. (Interlocks should not prevent manual operation or "inching" by remote control.)
Barrier with electric contact or mechanical stop activating mechanical or electric brake.	Barrier quickly stops machine or prevents application of injurious pressure when any part of the operator's body contacts it or approaches danger zone.
Electric eye	Electric-eye beam and brake quickly stops machine or prevents its starting if the hands are in the danger zone.

Methods of Guarding Actions and Motions—Automatic Guards

Guarding methods	Guard action
Push-away device with barrier.	A movable barrier, attached to pressure part, pushes or lifts hands out of danger zone.
Pull-away device	A cable operated attachment on ram, connected to the operator's hands or arms to pull the hands back only if they remain in the danger zone; otherwise, it does not interfere with normal operation.
Limitation of stroke	Plunger travel limited to ¼ inch or less; fingers cannot enter between pressure points.

Methods of Guarding Actions and Motions—Remote Control, Placement, Feeding, Ejecting

Guarding methods	Guard action
Two-hand trip (can be adapted to multiple operation).	Simultaneous pressure of two hands on switch buttons in series actuates machine.
	Simultaneous pressure of two hands on air control valves, mechanical levers, controls interlocked with foot controls, or the removal of solid blocks or stops permits normal operation of machine.

Automatic or semiautomatic feed (with enclosure of danger points).	Stock fed by chutes, hoppers, conveyors, movable dies, dial feed rolls, etc. Enclosure will not admit any part of body.
Special jigs or feeding devices.	Hand-operated feeding devices of metal or wood which keep the operator's hands at a safe distance from the danger point.
Special tools or handles on dies.	Long handled tongs, vacuum lifters, or hand die holders which avoid need for operator putting his hand in the danger zone.
Special ejecting devices	Air or mechanical ejection

[Tables on guarding by location, awareness devices and lockout should follow here.]

III. TECHNIQUES OF MACHINERY SAFEGUARDING

It is recognized that a given situation—a hazard-creating motion or action—may frequently be guarded in a number of ways, several of which may be satisfactory. The selection of guarding method to be used may depend upon a number of things—space limitations, production methods, size of stock, frequency of use, and still other factors may be important in making the final decision. It is not the intent of this appendix suggest which method of guarding is the best for a given situation, but rather to show that there are a number of ways to guard each different condition. This will be done by illustrative typical situations which may be guarded by a variety of methods.

In the illustrations, the various motions and actions are shown with typical guards illustrating the various guarding techniques. It is not possible to apply all of the guarding techniques to all of the motions or actions, but an effort has been made to show those that are frequently found in industry.

Illustrations contained in this section of Appendix A are as follows:

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Winder drum end guard 14

GUARDING ROTATING, RECIPROCATING, OR TRANSVERSE MOTIONS

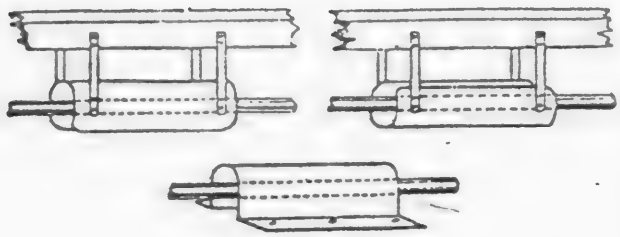
Rotating, reciprocating, and transverse motions are forms or directions of motion that are used for a variety of purposes. They may be used to transmit power, as for example a revolving shaft or pulley (rotating), a moving piston (reciprocating), or a moving belt (transverse). Motions are also used to perform work by giving action to a tool or die which performs a cutting or shearing action. Thus, a circular saw or milling cutter (rotating), a metal planer or shaper (reciprocating), or a band saw (transverse) are examples of using motion to perform useful work by means of a tool.

Motion is also used as a means of performing work without the cutting action of tools. A centrifugal extractor or dough mixer (rotating), a shaker screen (reciprocating), or a belt or screw conveyor (transverse) are examples of using the energy of motion to perform useful work.

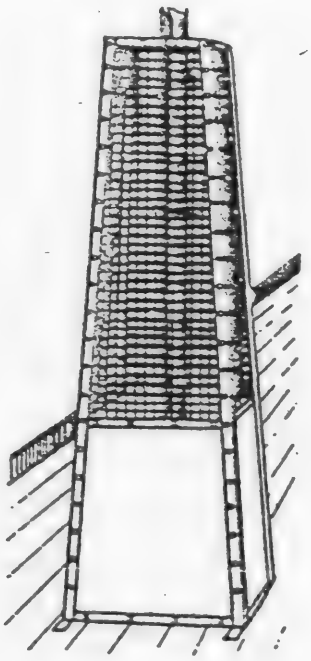
The illustrations on the next nine pages are intended to show recognized techniques for guarding various forms of motion used for transmitting power and for performing work without the benefit of tools.

Where tools are used to perform useful work, a cutting, punching, bending, or shearing action is involved. Techniques of guarding these various actions will be illustrated under the general heading of the type of action, instead of under the heading of the type of motion, used to drive or power the tool.

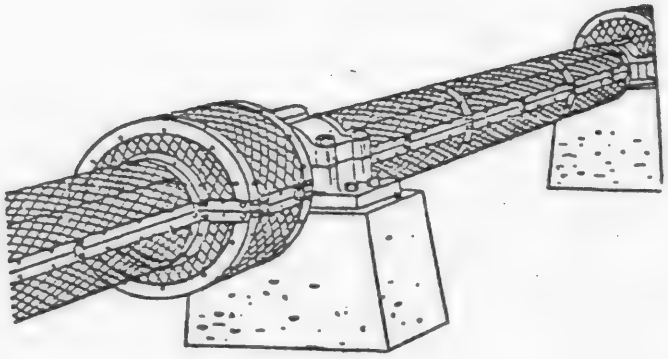
Guarding Rotating Motion by Enclosure Guards



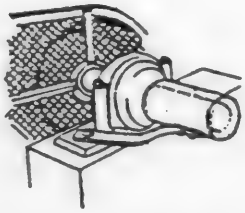
Horizontal shafting.



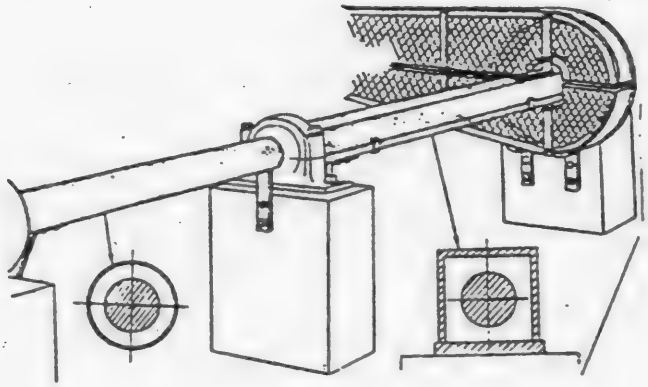
Vertical shafting.



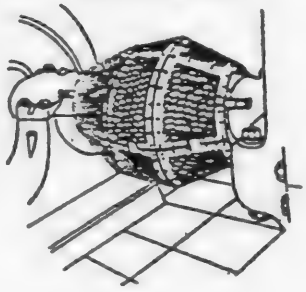
Horizontal shafting.



Sleeve for shaft end.

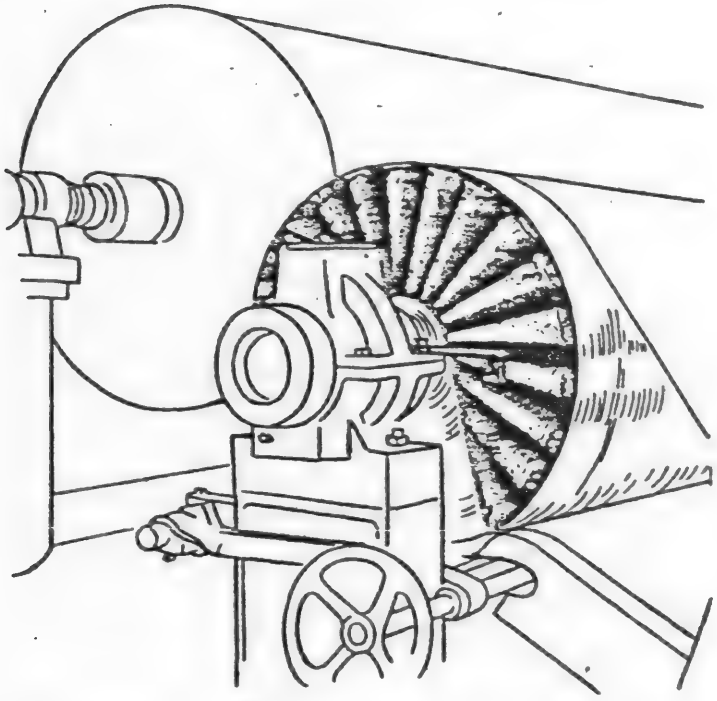


Horizontal shafting and belt and pulley.

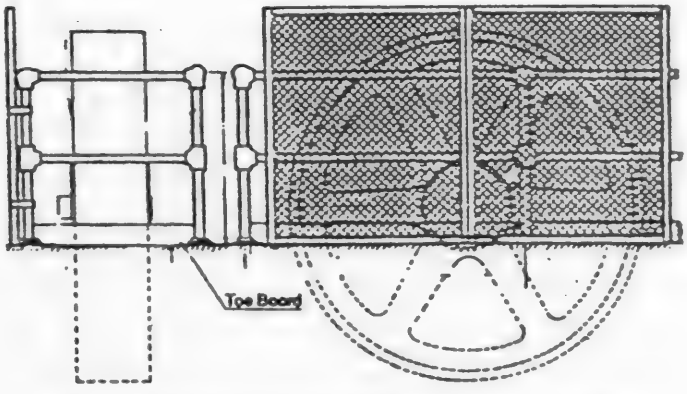


Coupling.

Guarding Rotating Motion by Barrier Guards

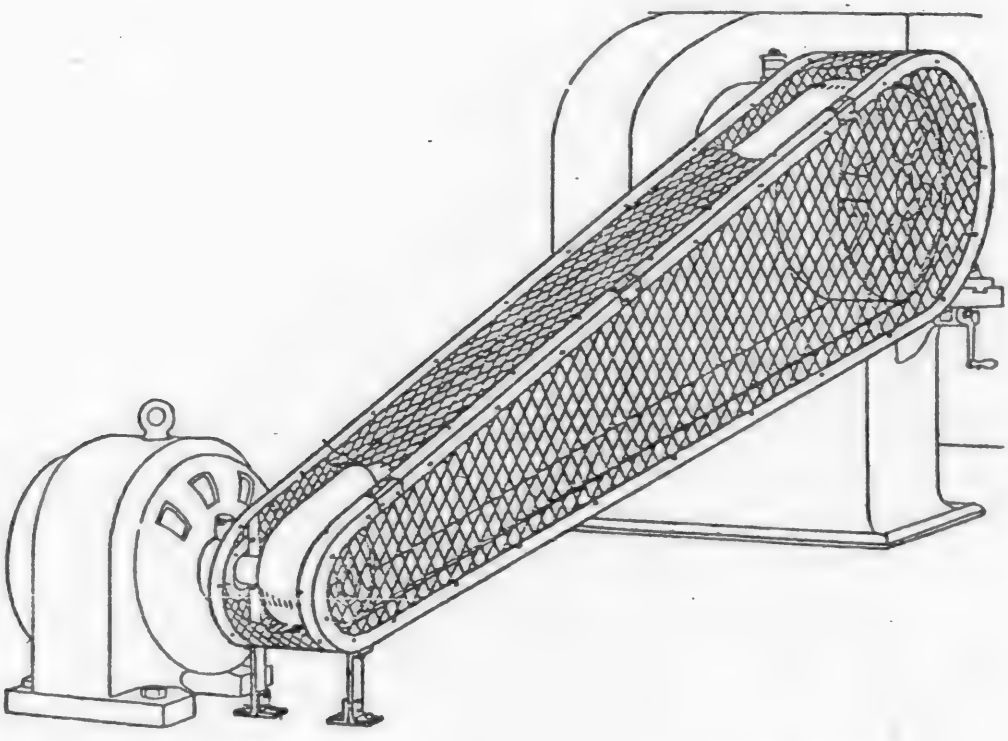


Winder drum end guard—guard provides a stationary object to grasp if operator should slip while changing paper.

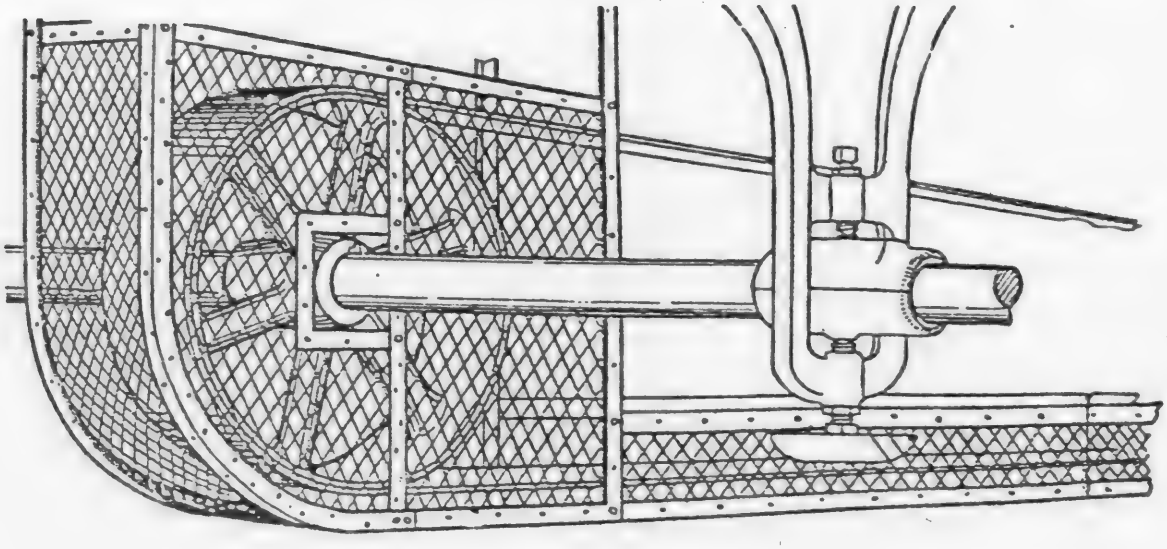


Flywheel guard—barrier for flywheel and flywheel pit guard.

Guarding Rotating and Transverse Motions by Enclosure Guards

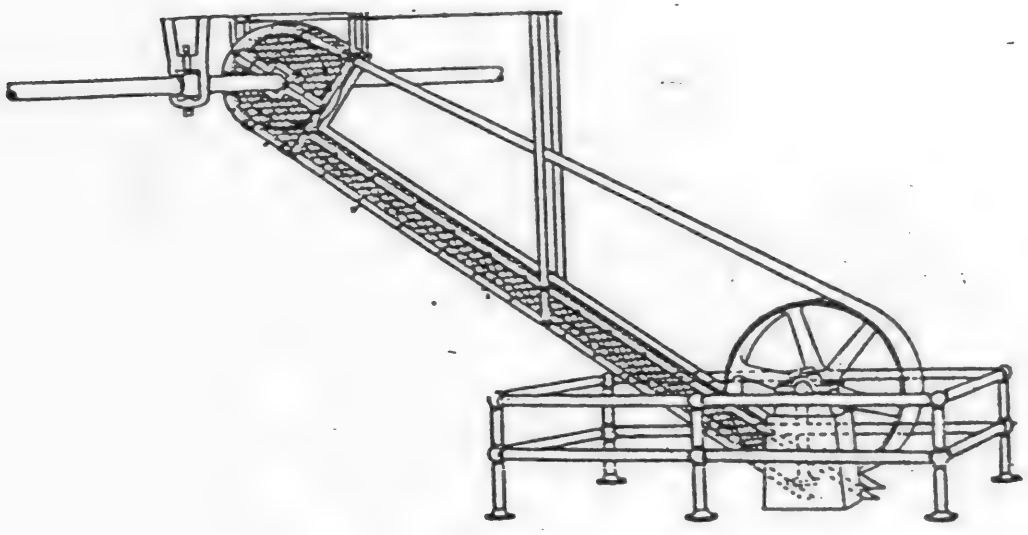


Pulleys with inclined belt.

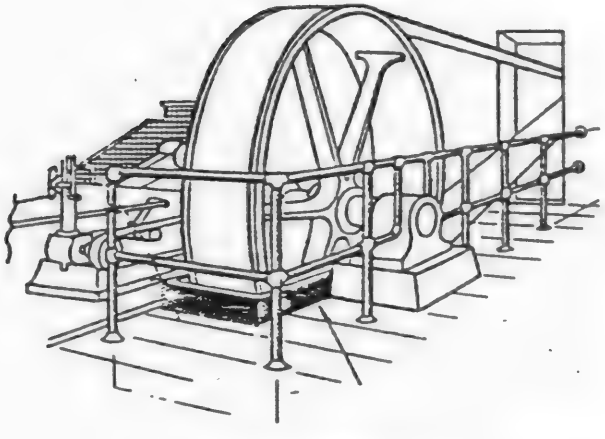


Overhead horizontal belt and pulley.

Guarding Rotating and Transverse Motions by Barrier Guards

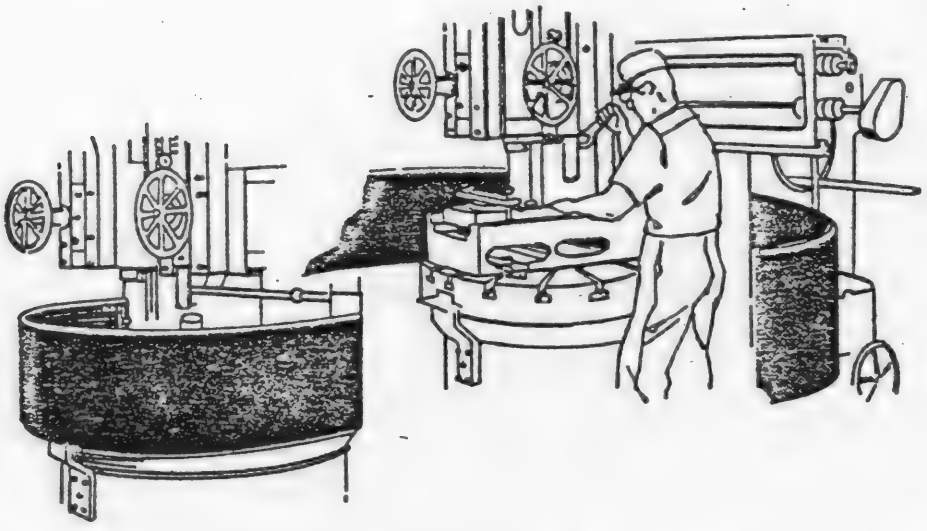


Pulleys and inclined belt.

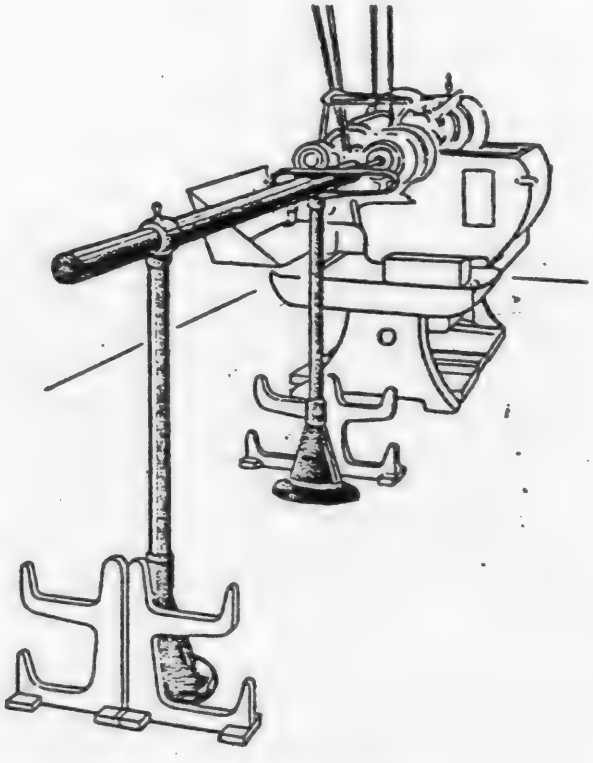


Flywheel with horizontal belt.

Guarding Rotating Machines or Machine Parts With Barrier Guards

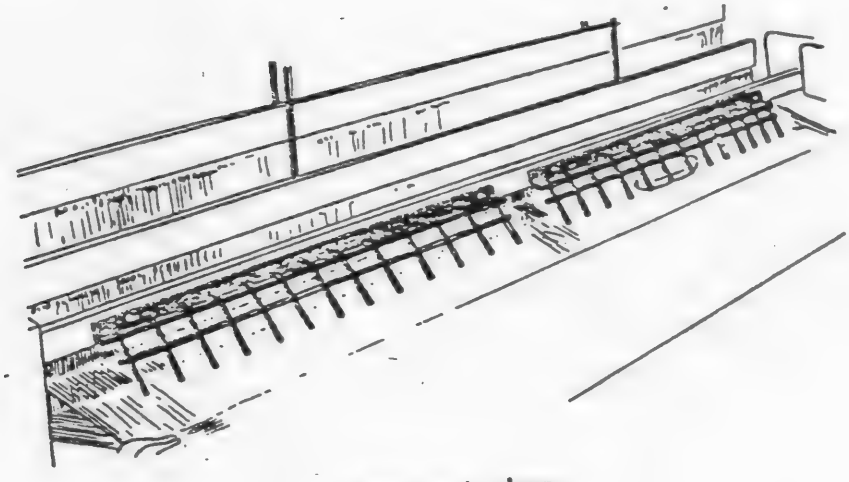


Barrier guard for vertical boring mill—guard is made in two sections, hinges to the machine and easily opened.

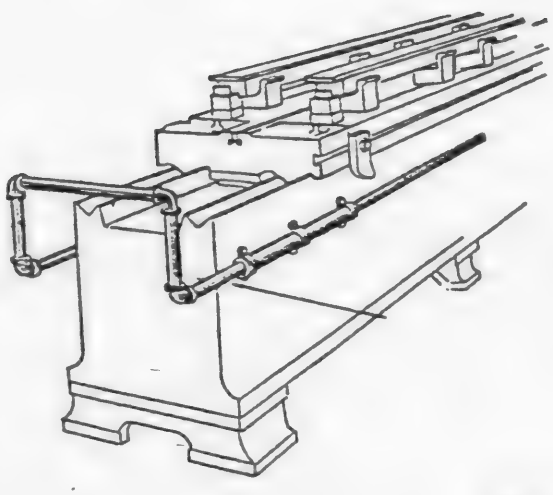


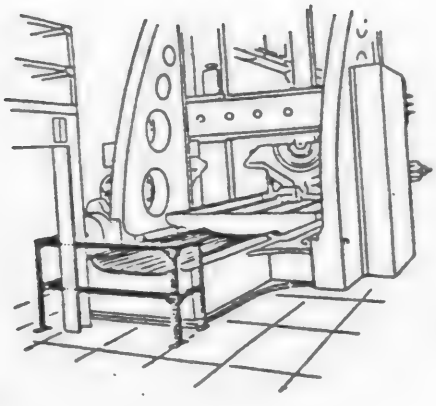
Revolving bar stock guard.

Guarding Reciprocating Motion of Machine Parts by Barrier Guard



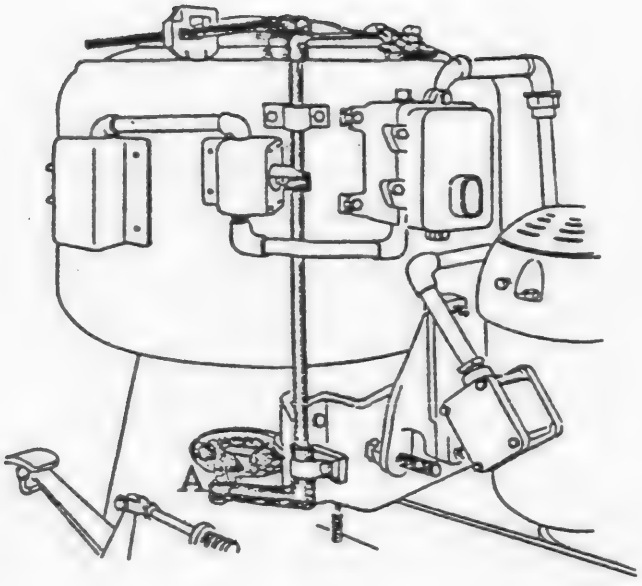
Shuttle guard on loom.



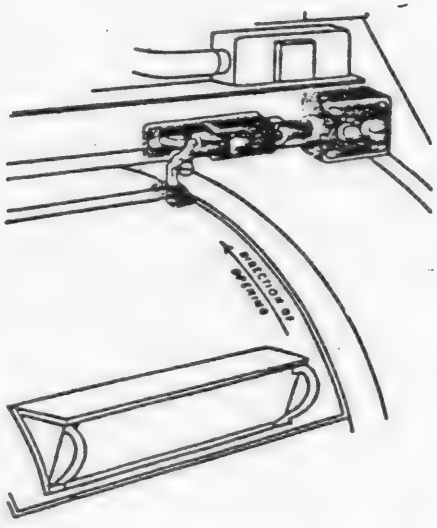


Planer table guards.

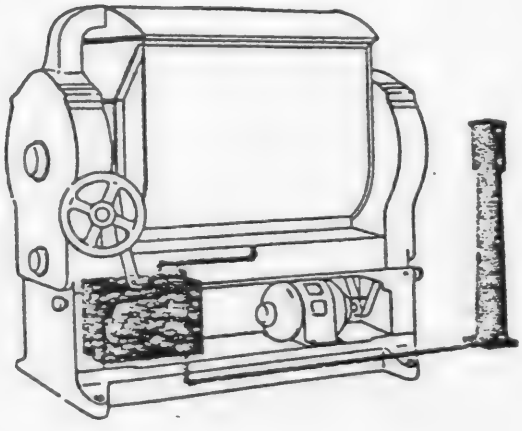
Guarding Rotating Motion of Machine Parts by Interlocks



Interlocking extractor cover guard. The cover is mechanically interlocked with the spindle so that the cover cannot be removed until the spindle is at rest.

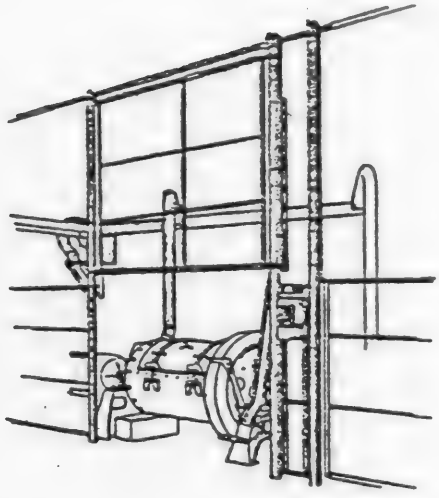


Electrical interlock on washing machine. When door is opened the circuit to motor drive is broken, thus stopping the machine.

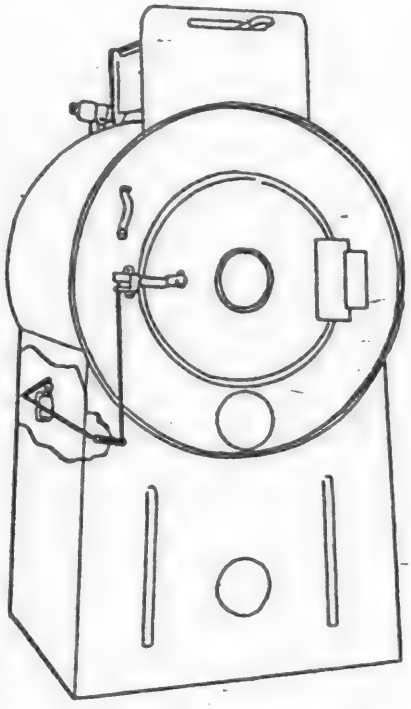


Electrical interlock for tilting dough mixer. The electric circuit is closed only when the barrel is in upright position. Mixer can be operated in tilted position by constant pressure applied to a second switch.

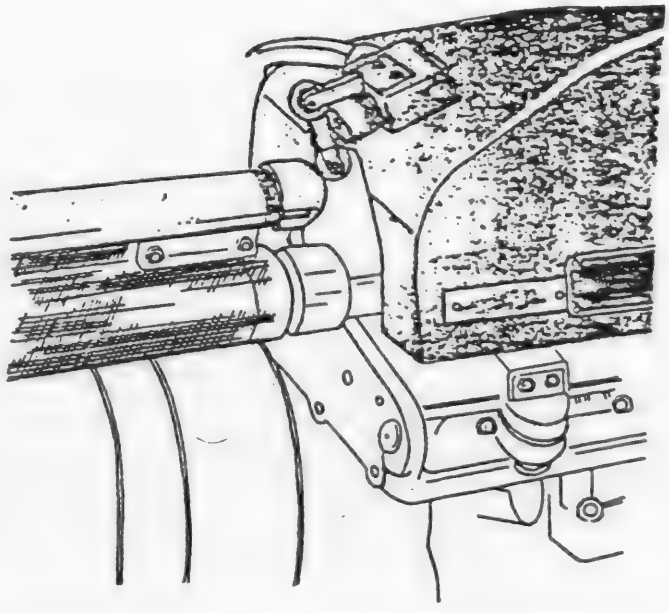
Guarding Rotating Motion of Machine Parts by Interlocks



Guard for rattler or tanning drum. Angle iron gate frame is electrically interlocked so that the rattler cannot be operated unless the gate is closed.

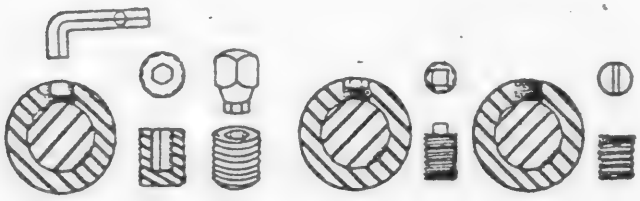


Guard for tumbler barrel. When door is opened the circuit is broken and the revolving cylinder stops.

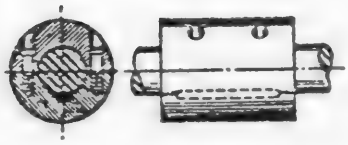


Guard for bar support of screw machine. When bar support or spindle cover is removed to open position, power to machine is cut off.

Elimination of Rotating Motion Hazard by Means Other Than Guarding



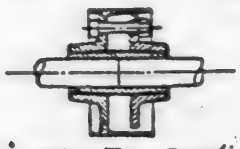
Safety set screws.



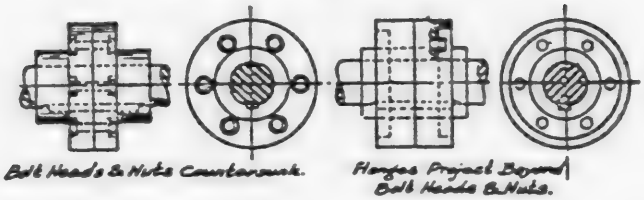
Split Coupling

Solid Sleeve Coupling

Clamp Coupling with Safety Sleeve



Compression Type Coupling



Safety shaft couplings.

GUARDING IN-RUNNING NIP POINTS

In-running nip points may exist under two broad classes of conditions, namely:

1. Those purposely created to do useful work.

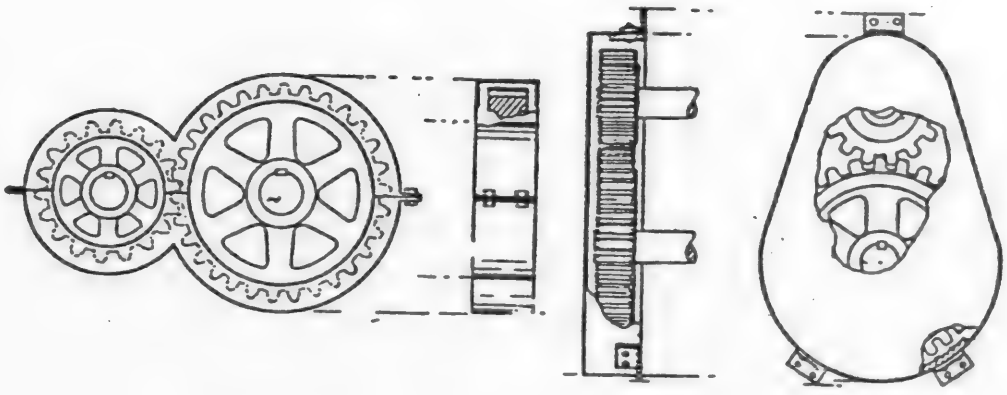
2. Those which are incidental to the transmission of power or the application of motion, the nip point itself doing no useful work.

Nip points that are purposely created to do useful work would include situations such as calender rolls used for finishing paper, rolls used for mixing ink or rubber, and rolling mills used for reducing the thickness of or changing the shape of metals.

Nip points created incidental to the transmission of power would include the nip point of a belt and pulley, the meshing of gears, or the take-off point of a belt conveyor. Nip points created incidental to the application of motion would include the nip or pinch point of the moving bed of a metal planer with the frame of the machine or an adjacent fixed object.

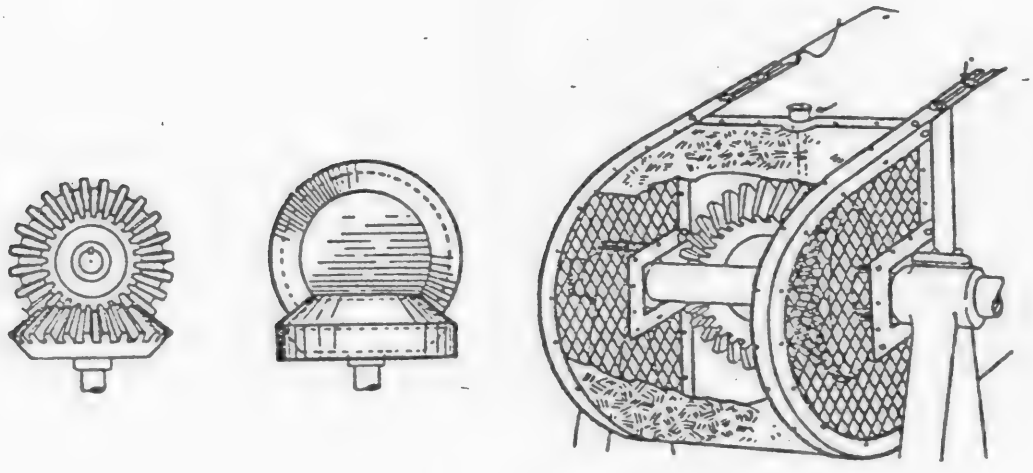
In any case, guarding is necessary and various means may be used to provide protection. The following illustrations show typical nip point situations and techniques for guarding them.

Guarding In-Running Nip Points by Enclosure Guards

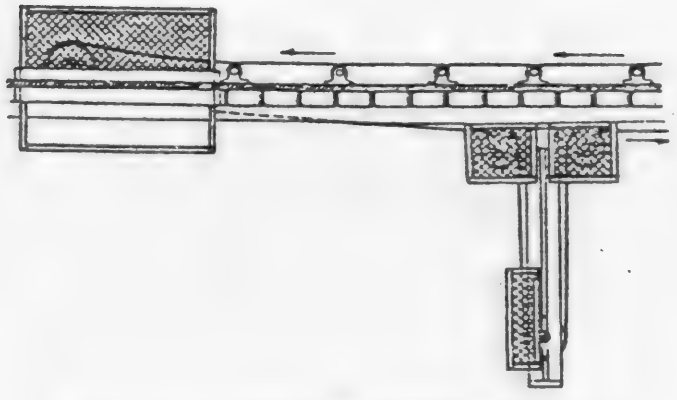


Spur gear guards.

Guarding In-Running Nip Points by Enclosure Guards

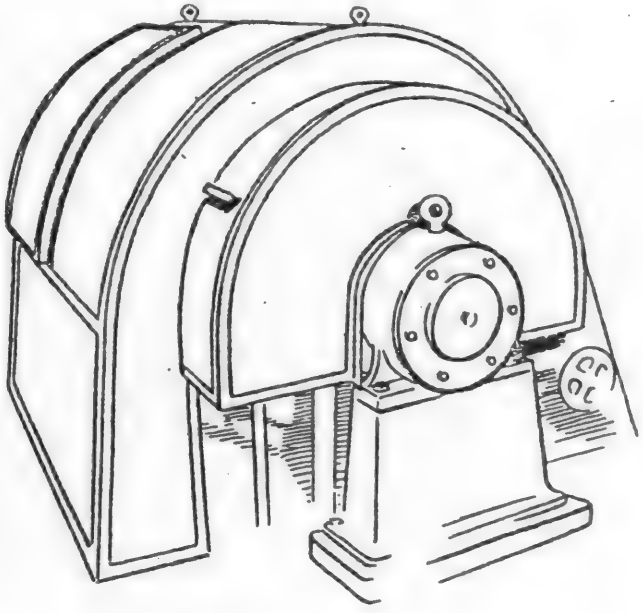


Bevel gear guards.

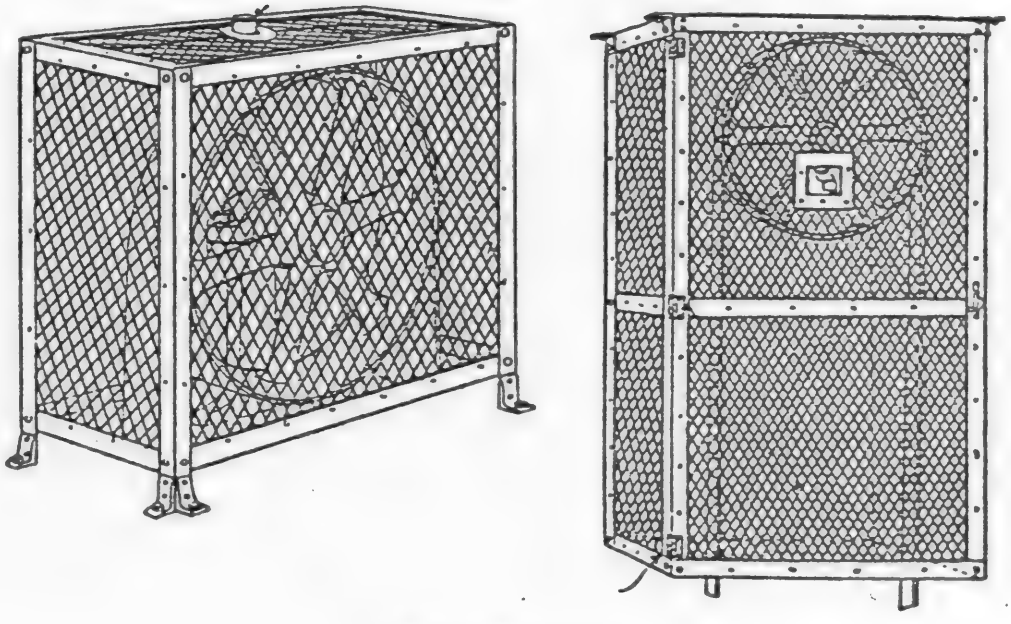


Elevated conveyor belt, pulleys, and belt tightener guard.

Guarding In-Running Nip Points by Enclosure Guards

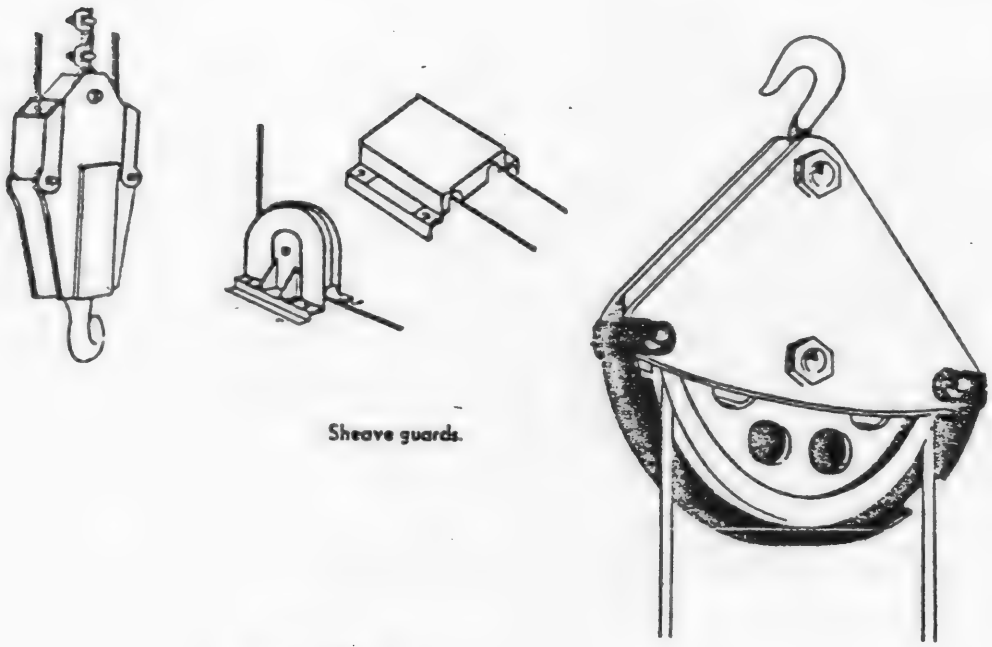


Calender stock drive guard.

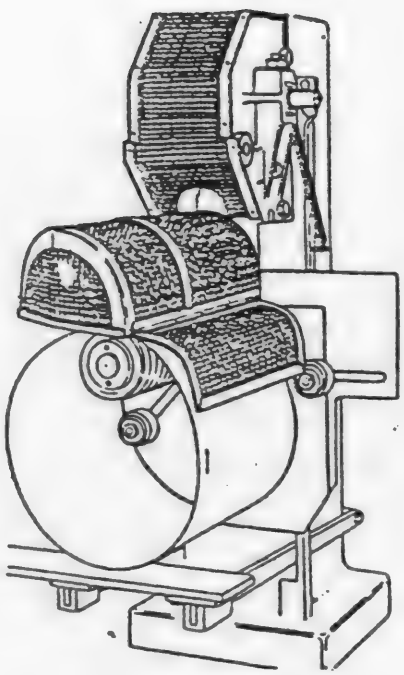


Belt and pulley guards.

Guarding In-Running Nip Points by Enclosure Guards

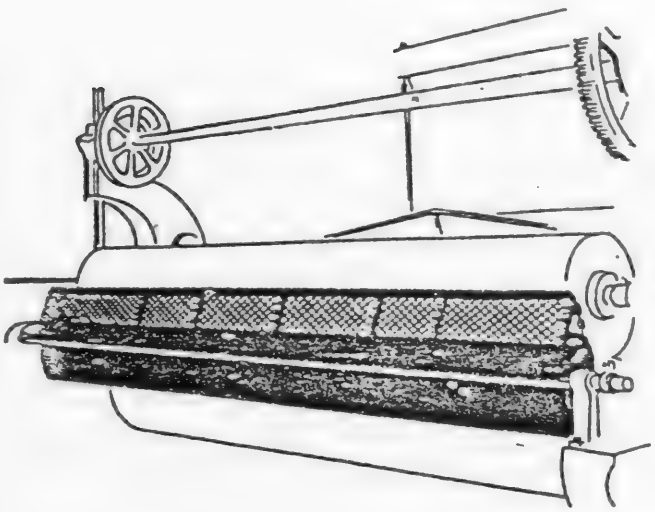


Sheave guards.



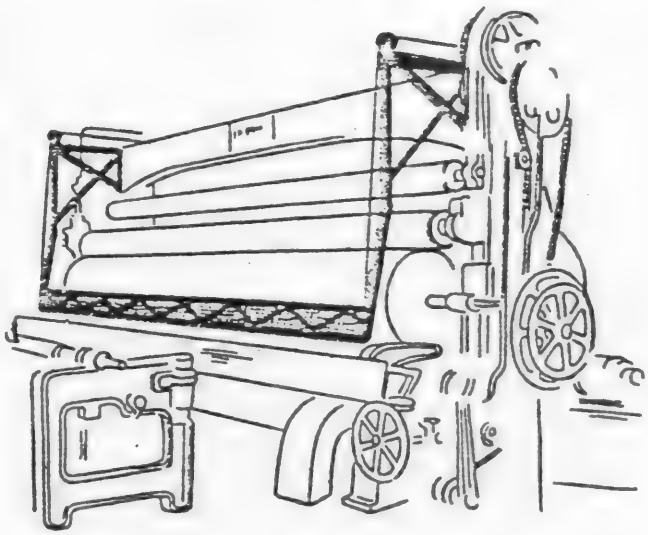
Dies of drum-corrugating machine.

Guarding In-Running Nip Points by Barrier Guards



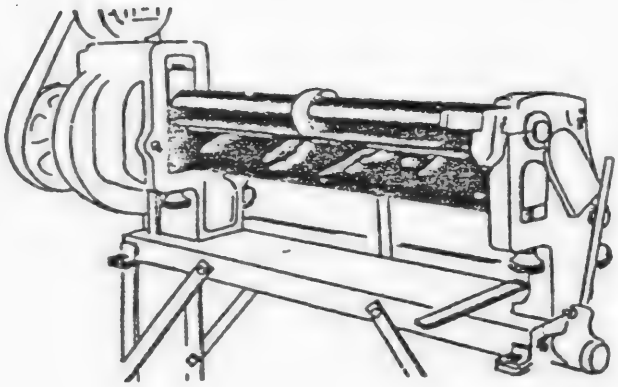
Guard is hung so that it can be swung down and out of the way when roll is being started or removed.

Guard is counterweighted and swung up out of the way when roll is being started or removed.

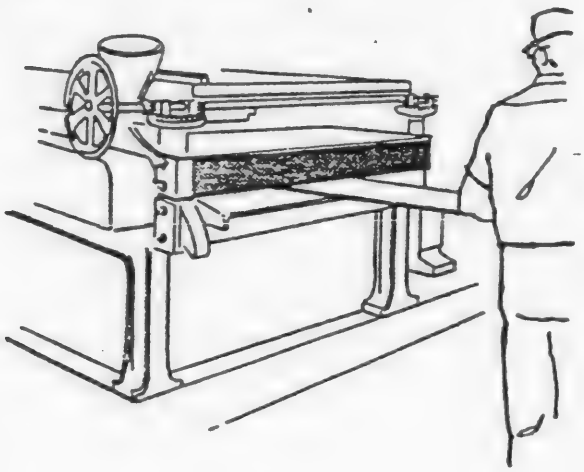


PAPER ROLL WINDER GUARDS

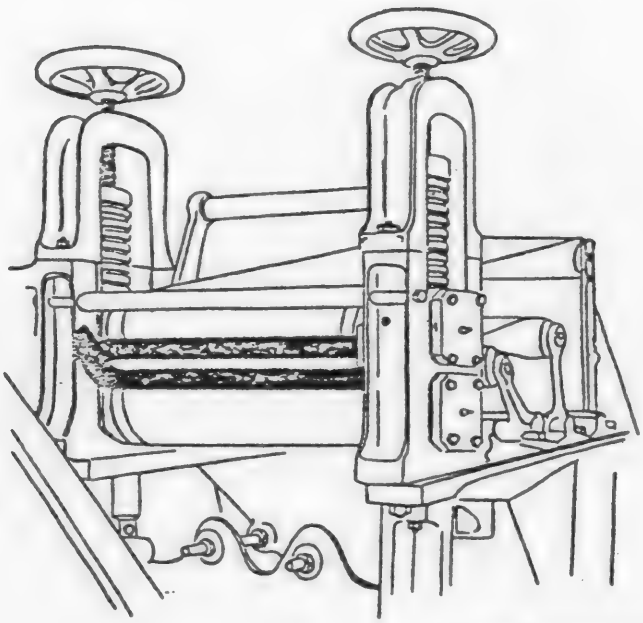
Guarding In-Running Nip Points by Barrier Guards



Upper roll covered with stationary cylindrical guard. Lower roll has an apron guard. Opening between guards is less than 3/8 inch.



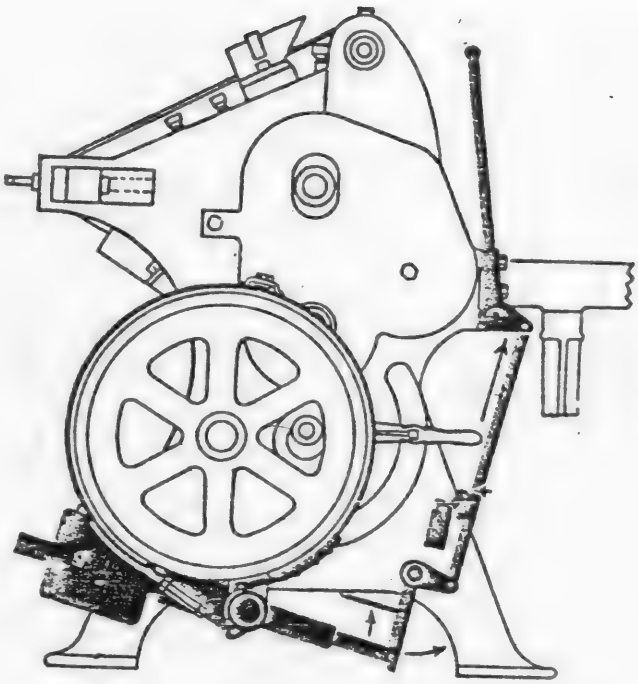
Barrier guard protecting rolls of leveling machine.



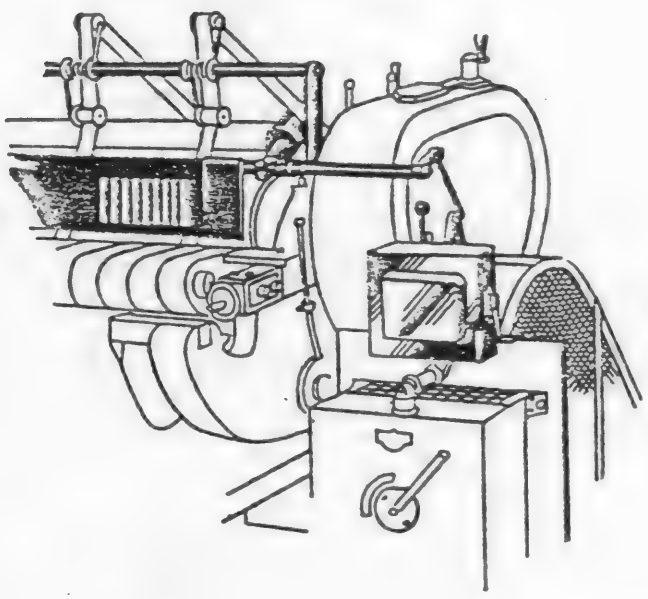
Barrier guard for rolls on paper embossing machine.

METAL ROLL GUARDS

Guarding-In Running Nip Points by Interlocking Device

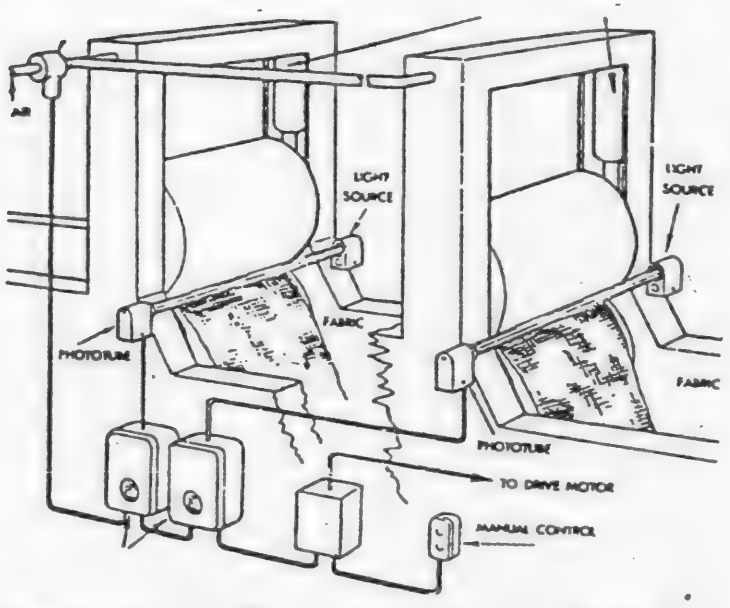


Dough brake guard. The pressure of the operator's body against horizontal release across front of machine simultaneously breaks electric current at contact switch and trips weight operating brake on flywheel, thus quickly stopping machine.



Flatwork ironer guard. If operator's hand strikes hinged barrier, the contact switch opens circuit and stops machine.

Guarding In-Running Nip Points by Interlocking Device



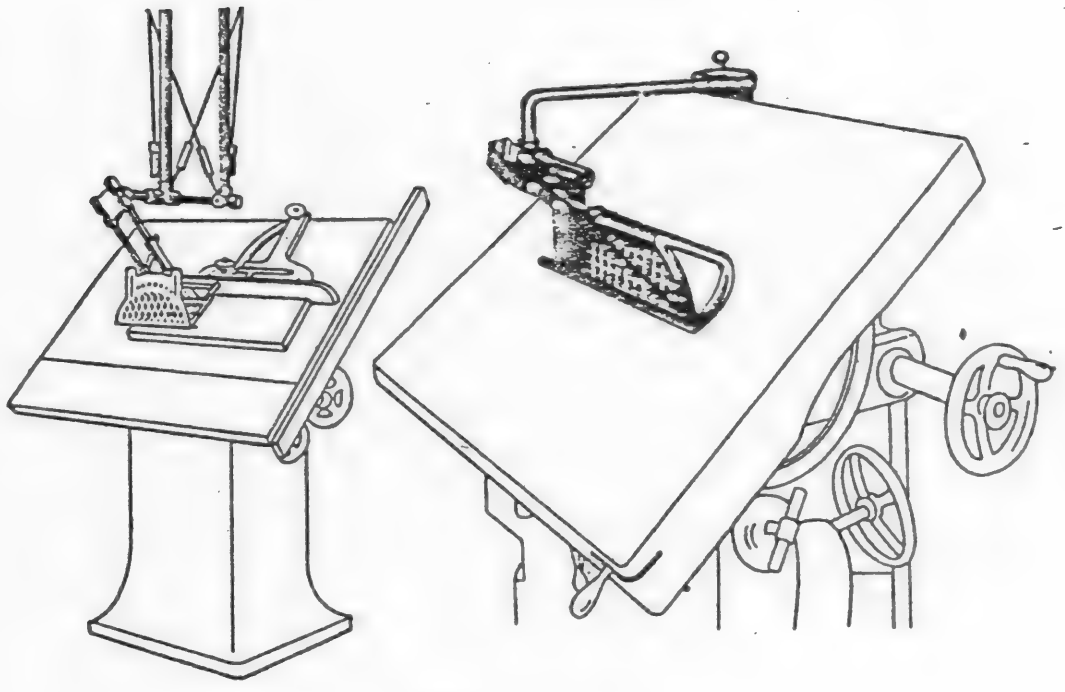
Textile finishing machine. The photoelectric control beam is projected across the 12-foot width of the pressure rolls at the nip where the two rolls meet. Any part of an operator's body or any other object coming within the danger area of the nip will break the control beam. If the beam is broken, photoelectric relay action immediately stops the drive motor and at the same time operates the air cylinder solenoid valve, releasing the pressure and opening the rolls.

GUARDING CUTTING ACTIONS

Cutting action is involved in the whole range of machine tools used for cutting metal, also for machines used for working on wood. The characteristic of a machine tool is that the metal removed is in the form of chips. This characteristic also applies to machines used for cutting wood, although woodworking machines are not referred to as machine tools. Many machines used in the food, plastic, paper, or textile industries, as well as other industries, also employ cutting action. The hazard lies at the point where cutting takes place.

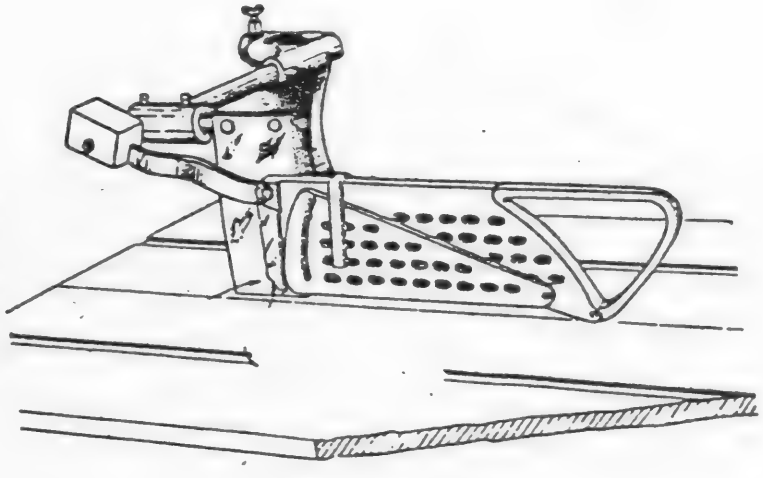
Various forms of motion may be involved in cutting action, but the kind of motion is not the determining factor in selecting the best guarding method. In many cases, a choice of guarding methods is available. The following illustrations show various methods of guarding typical cutting actions.

Guarding Cutting Actions by Enclosure Guards



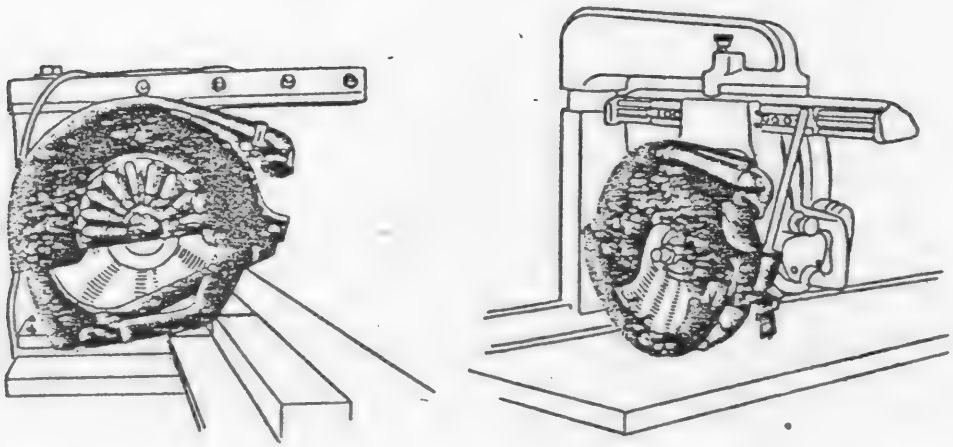
Tilting table saw guard.

Circular saws should be provided with a hood that covers the saw at all times to the depth of the teeth. Hood should adjust itself automatically to thickness of, and remain in contact with, material being cut. A spreader and antikickback device should be provided. The exposed part of the saw underneath the table should be guarded.

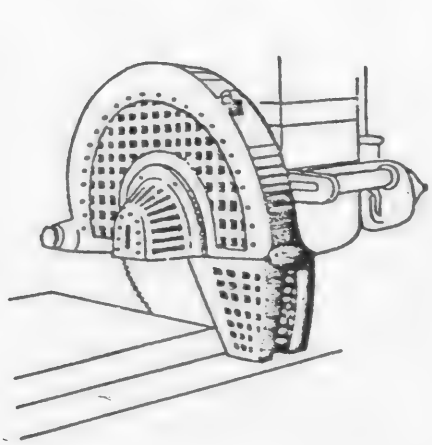


Rip saw guard.

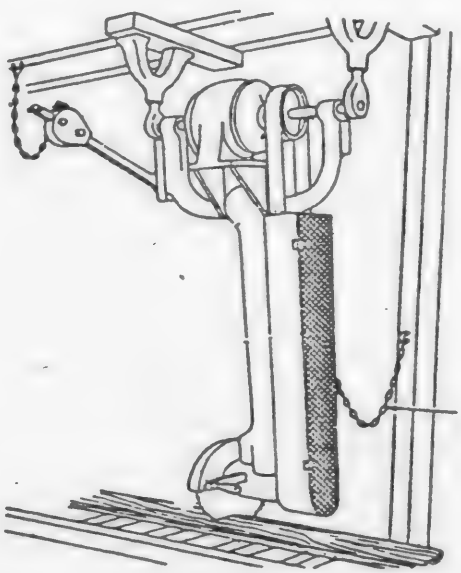
Guarding Cutting Actions by Enclosure Guards



Radial saw. In addition to hood enclosing the blade, an adjustable stop should be provided to limit forward travel and head should automatically return to starting position. When used for ripping, a spreader and antikickback device should be provided.



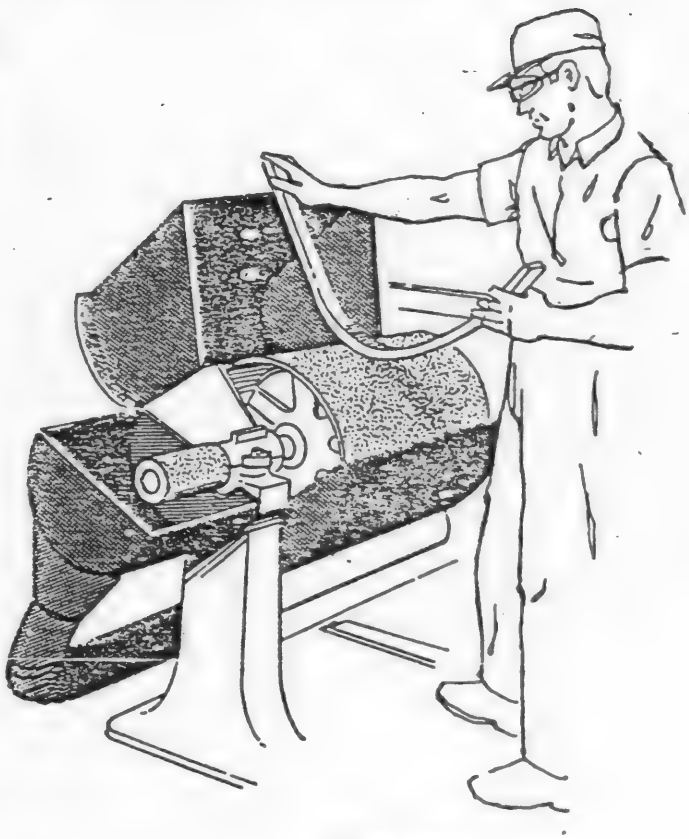
Swing saw hood



Swing saw. In addition to the hood enclosing the blade, the swing saw should be provided with a limit chain or other device to limit forward travel and a device to automatically return the head to starting position. Hood should enclose saw.

Guarding Cutting Actions by Enclosure Guards

Disc sander.

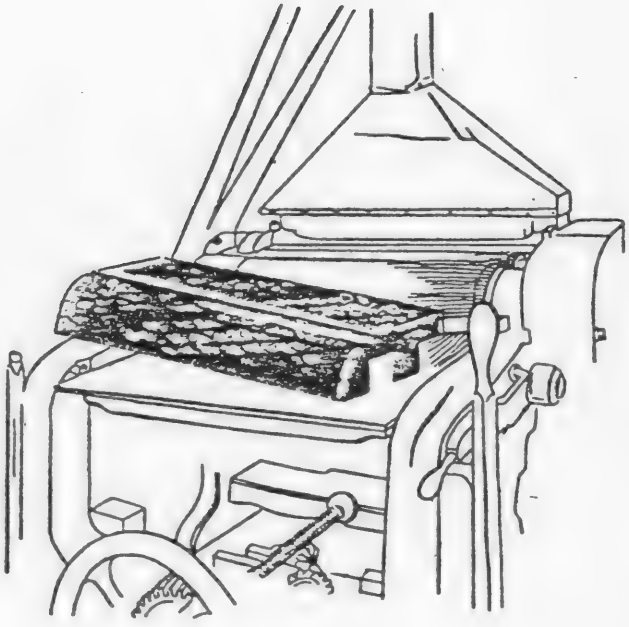


Drum sander.

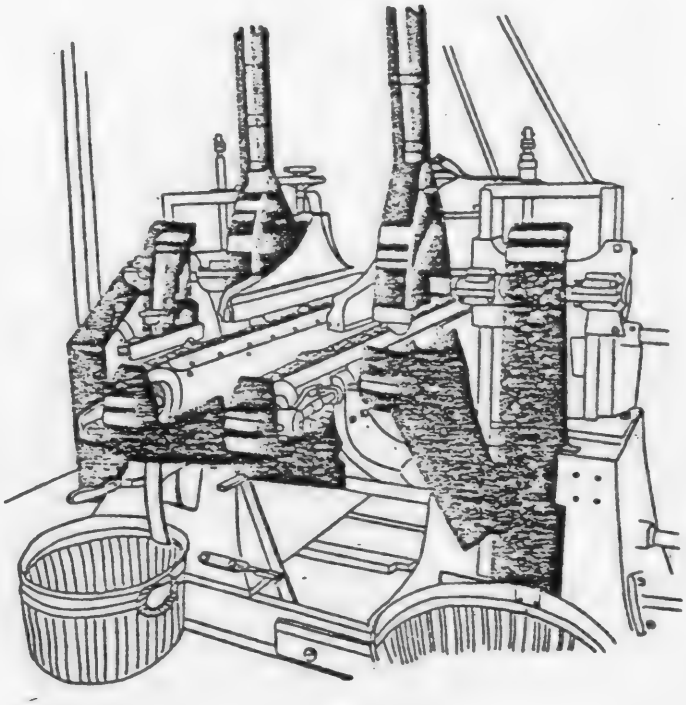
Roll feed sander.

Exposed parts of disc, drum or roll feed sanders should be guarded except that portion where the material comes in contact with the abrasive. Feed rolls in front of sander should also be guarded. Guards serve as dust collectors.

Guarding Cutting Actions by Enclosure Guards

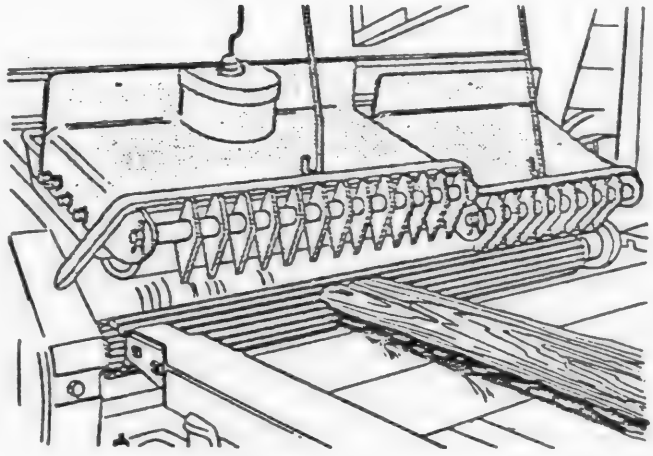


Planer. Guard for feed rolls removed showing substantial construction.



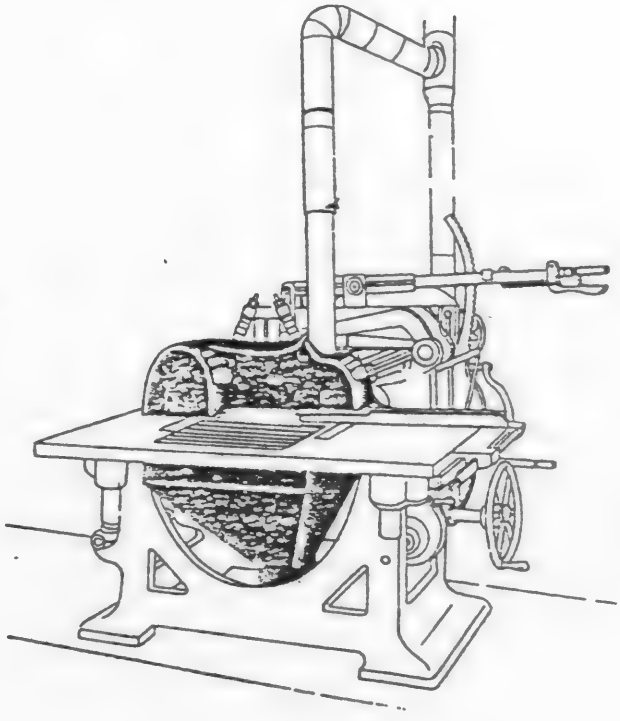
Double end tenoner.

Guarding Cutting Actions With Enclosure Guards

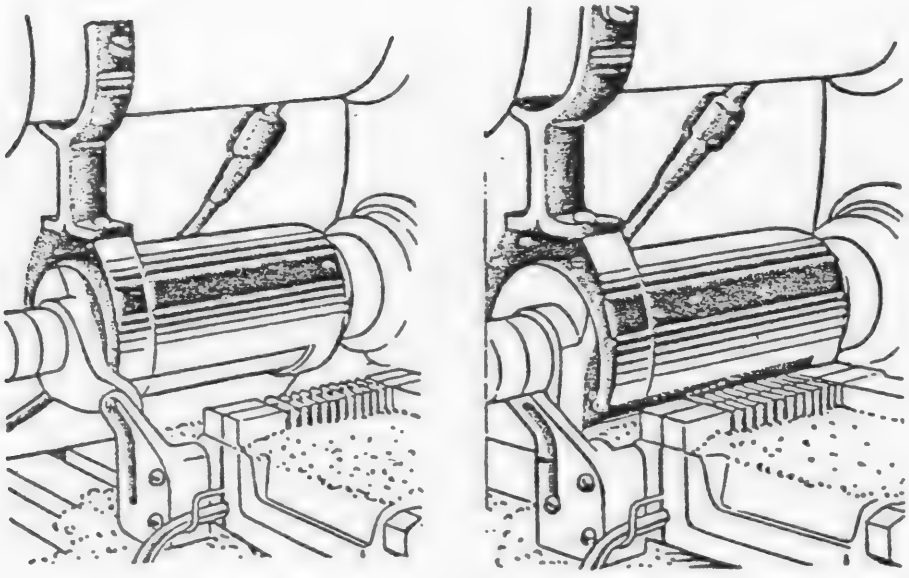


Edger. The saws of the edger should be enclosed and there should be pressure rolls on both the feed and take-off sides. Nonkickback teeth should be provided on at least the feed side of the saws. All belts, pulleys, and gears should be enclosed.

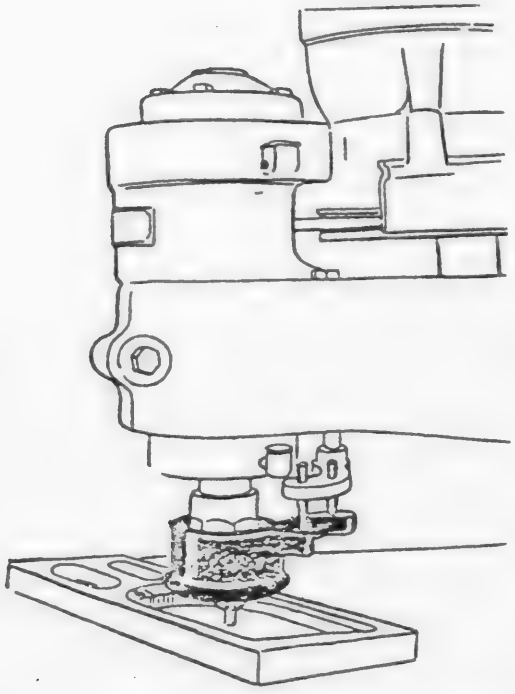
Self feed rip saw. Saw and feed rolls should be completely enclosed.



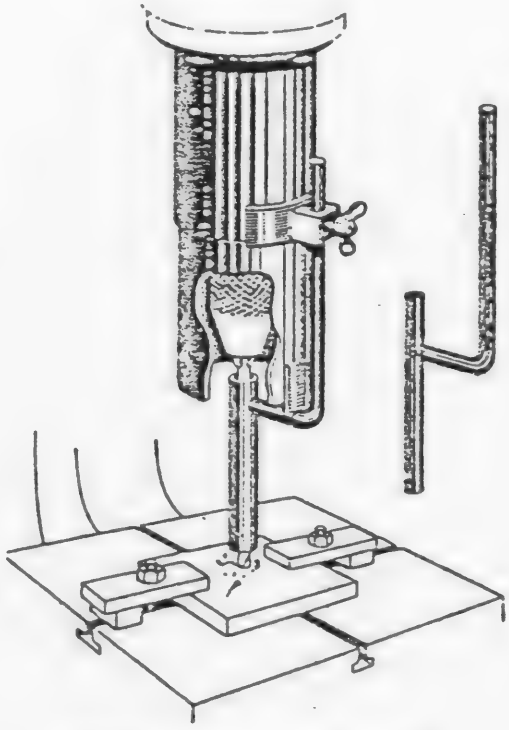
Guarding Cutting Actions by Enclosure Guards



Milling machines. Cutter is entirely enclosed when the table is withdrawn and the guard opens automatically as the table moves forward.

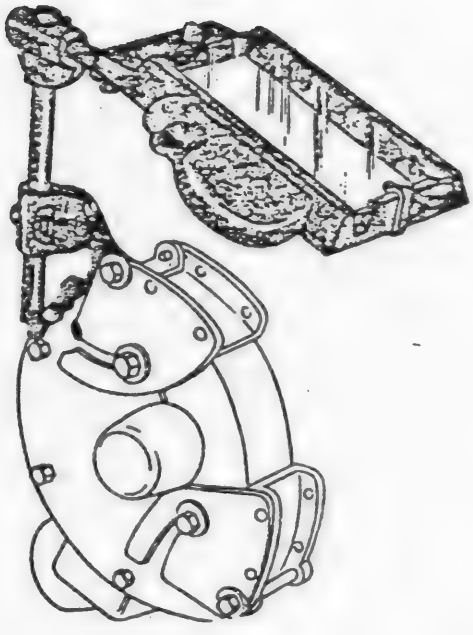


Router. Enclosure covers top and sides of router.



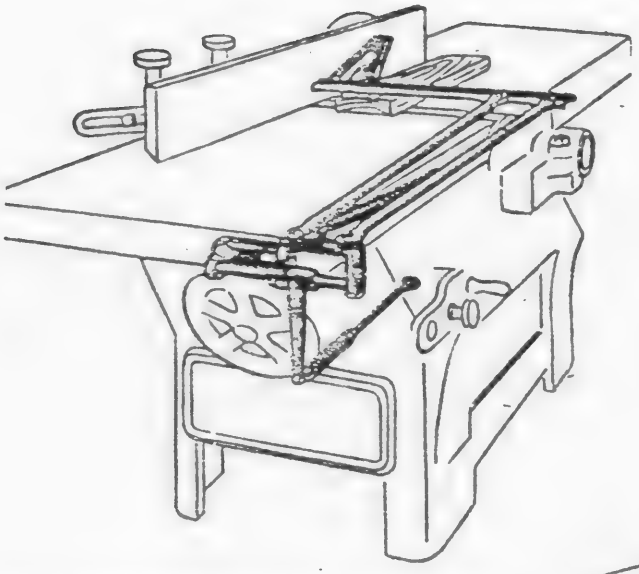
Drill. Enclosure covers spindle and drill.

Guarding Cutting Actions by Enclosure Guards

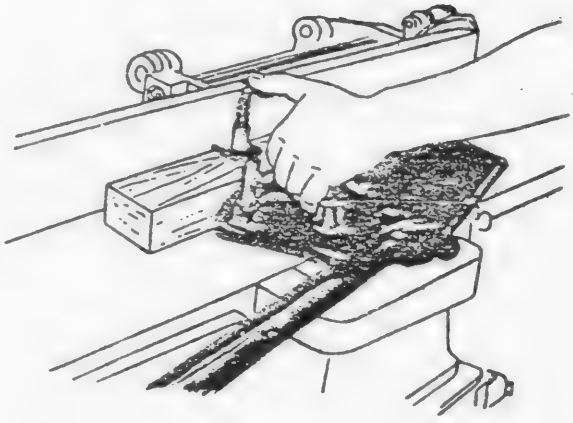


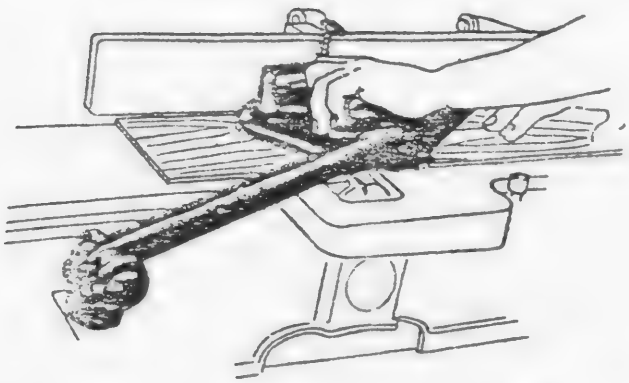
Abrasive wheel guard. Guard should be stong enough to withstand the shock of a bursting wheel and be adjustable to the wear of the wheel; tempered or laminated glass with protective glass on the underside should be used. Work rests should be kept adjusted close to the wheel with a maximum distance of 1/8 inch.

Guarding Cutting Actions by Barrier Guards



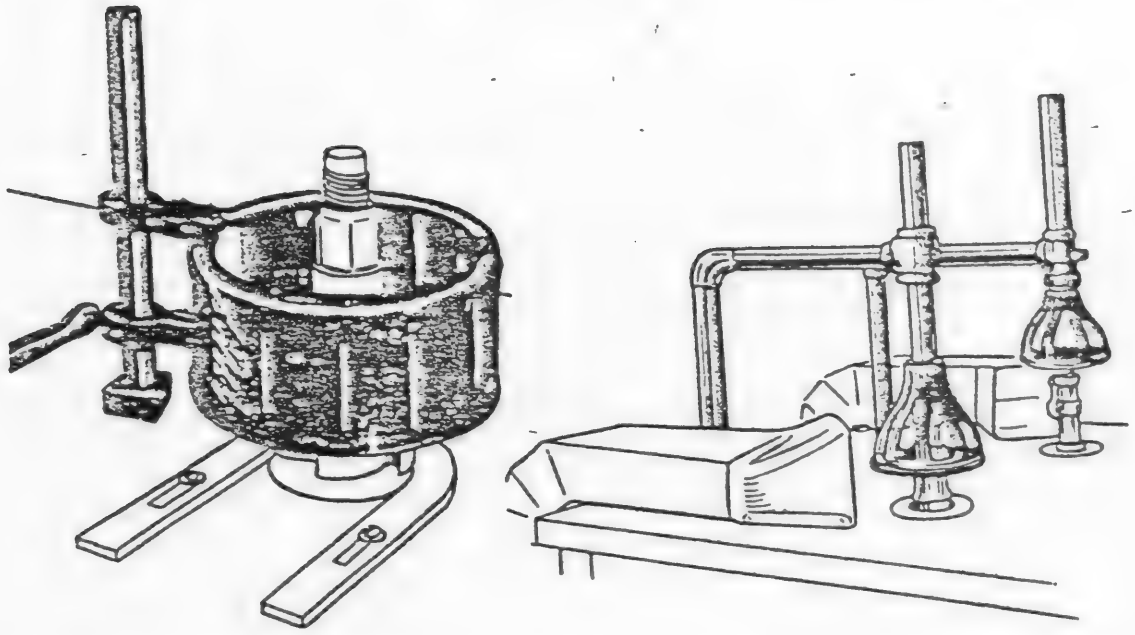
Jointer guards should automatically adjust themselves to cover all sections of the head on the working side of the fence or gage and should remain in contact with the material at all times. The section of the cutting head back of the fence or gage should also be guarded.



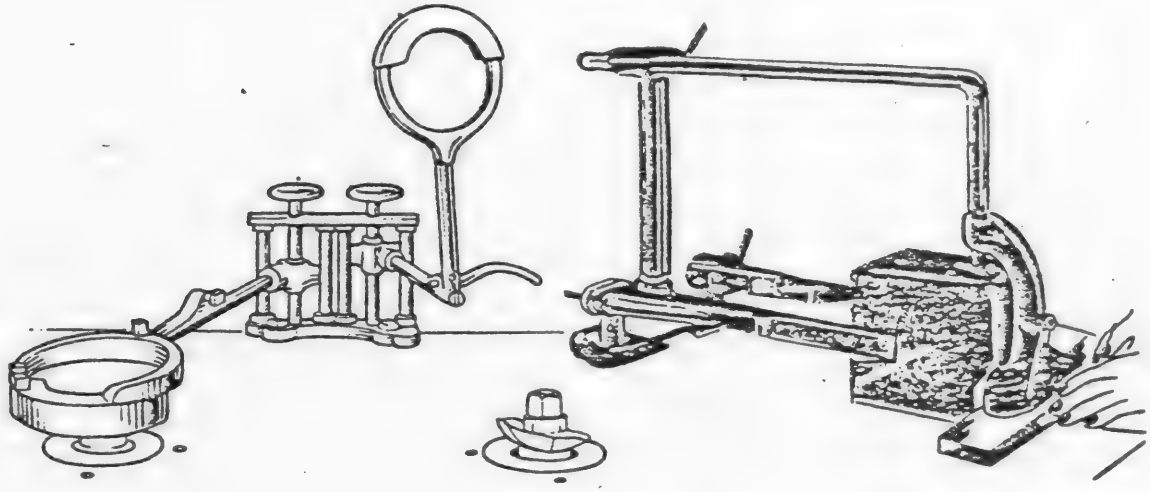


JOINTER GUARDS

Guarding Cutting Actions by Barrier Guards



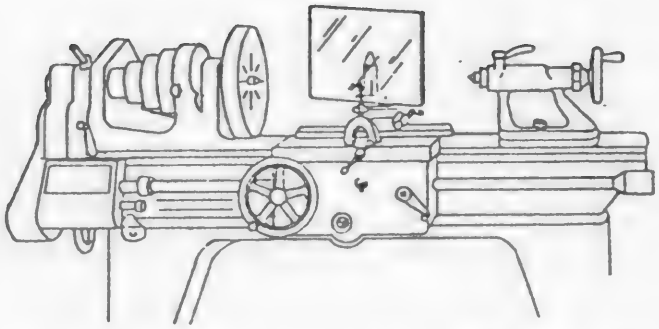
The cutting head of each wood shaper should be enclosed by an adjustable guard so designed as to keep the operator's hand away from the cutting edge. Patterns or jigs for holding stock while shaping are also desirable.



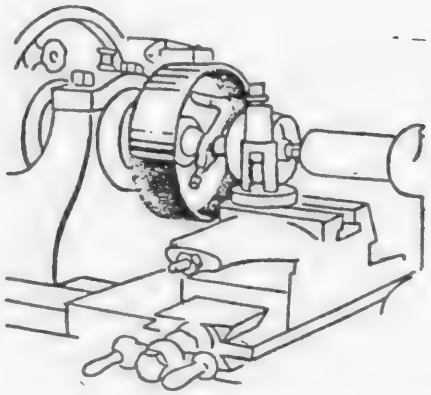
SHAPER GUARDS

Guarding Cutting Actions by Barrier Guards

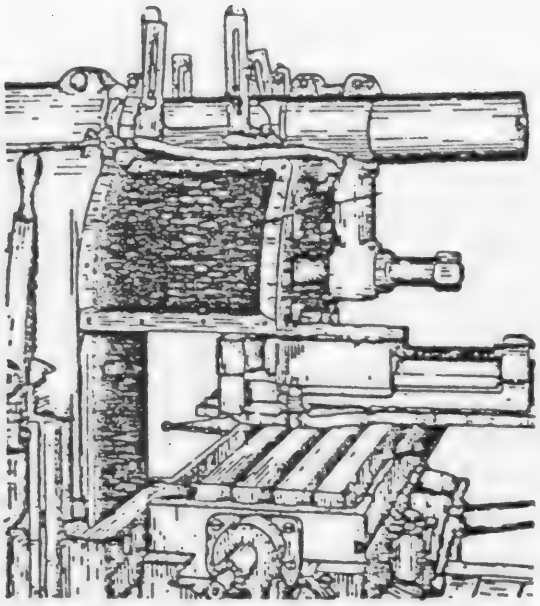
LATHES



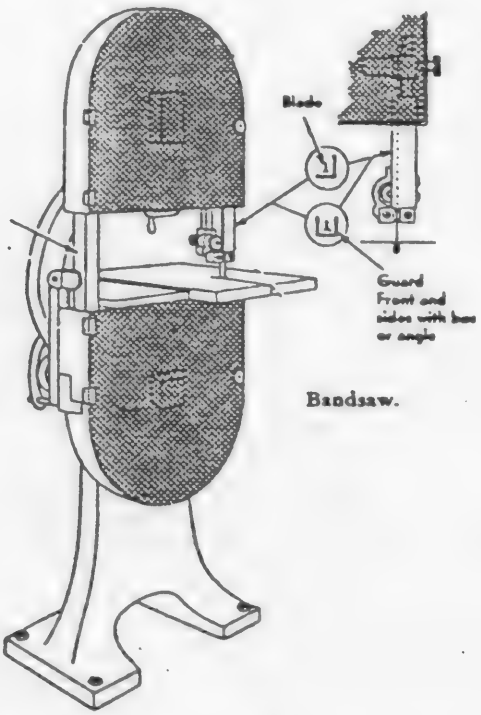
A clear plastic shield held in place by a magnet will protect against flying particles.



A metal band around the face plate prevents contact with the lathe dog.



Milling machine. Mesh guard over cutter to protect against contact and flying particles.



Bandsaw.

Band or band resaw wheels should be completely enclosed and all portions of the blade should be guarded, except that portion between the guide rolls and the table.

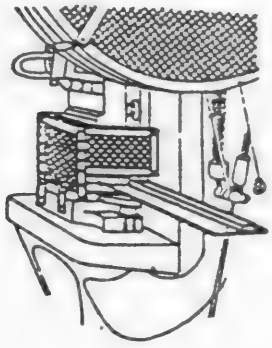
GUARDING PUNCHING, BENDING, AND SHEARING ACTIONS

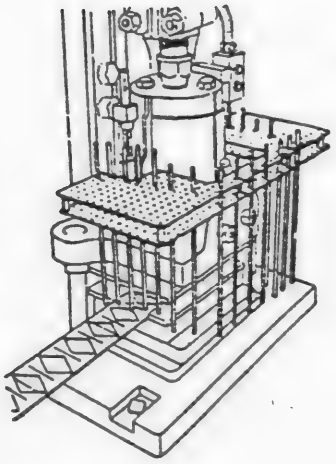
Punching, bending, and shearing actions differ from cutting actions in that material is not removed in the form of chips. This class of action is used primarily to form or shape metals, but may be used on materials other than metal, as for example, plastics, fabrics, and papers.

Punching, bending, and shearing actions are particularly hazardous with respect to the severity of injury inflicted, many such injuries resulting in amputations or other permanent disability. As in the case of cutting actions, the hazard is at the point-of-operation.

The following are illustrations of machines which perform punching, bending, or shearing actions and techniques by which they are guarded.

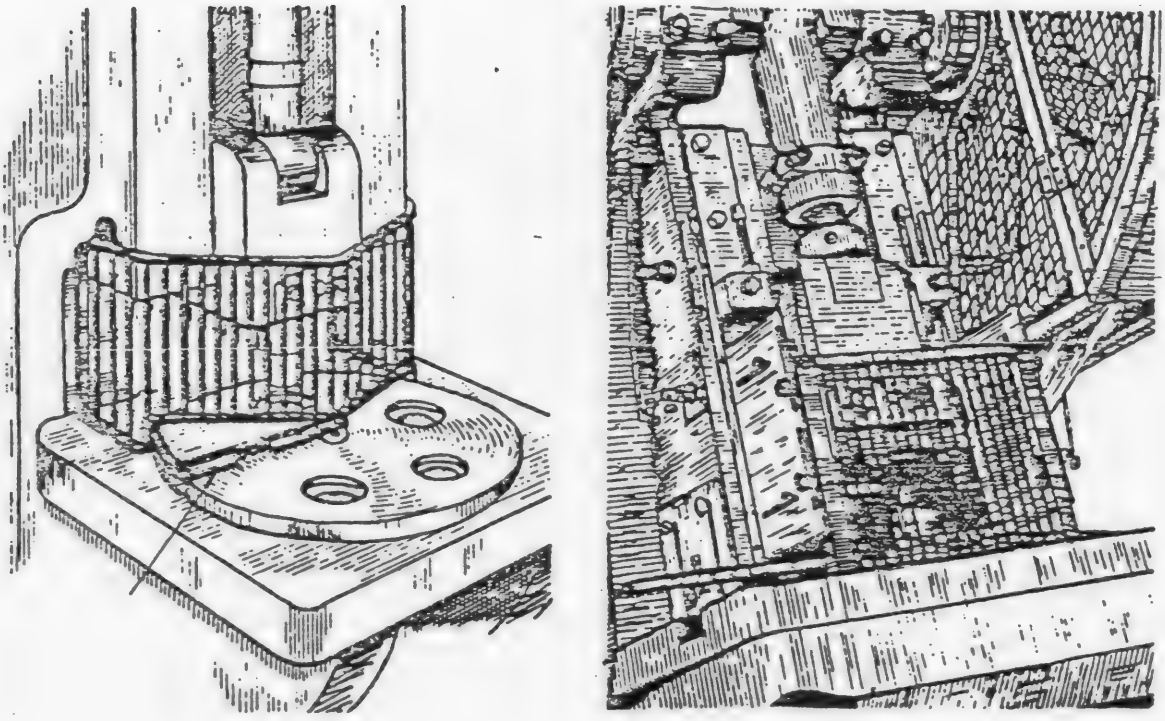
Guarding Punching or Bending Actions by Enclosure Guards





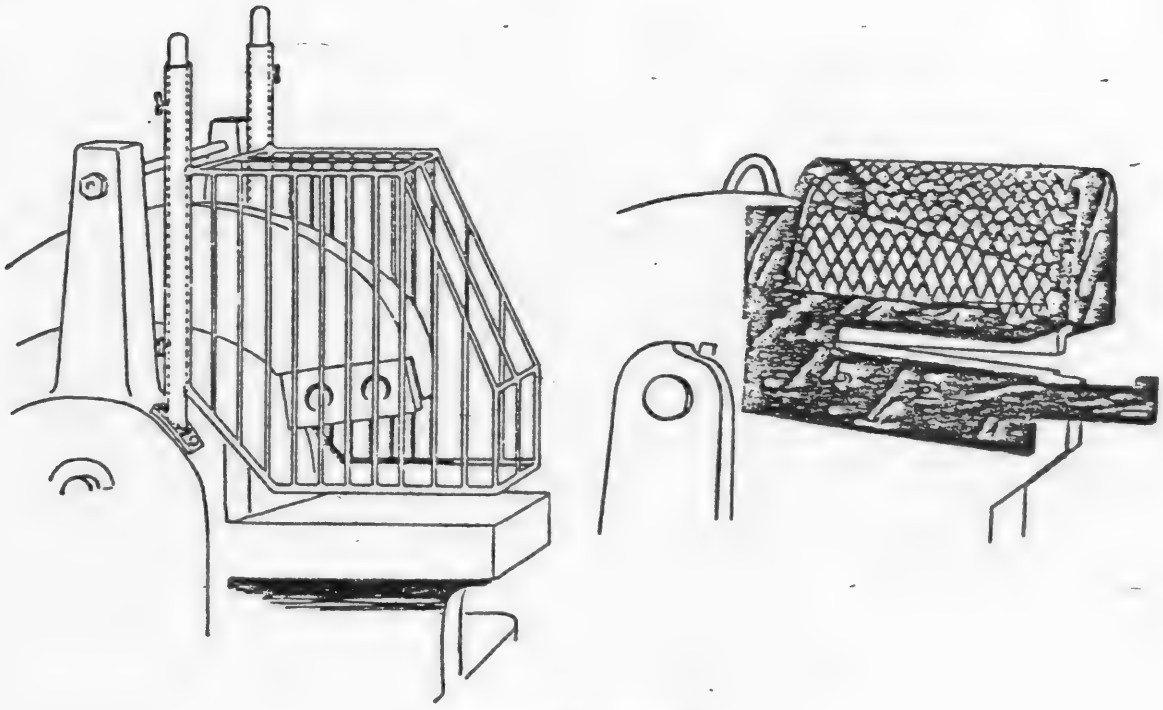
Enclosure guards for punching or forming presses for use with strip feeding.

Guarding Punching or Bending Actions by Enclosure Guards

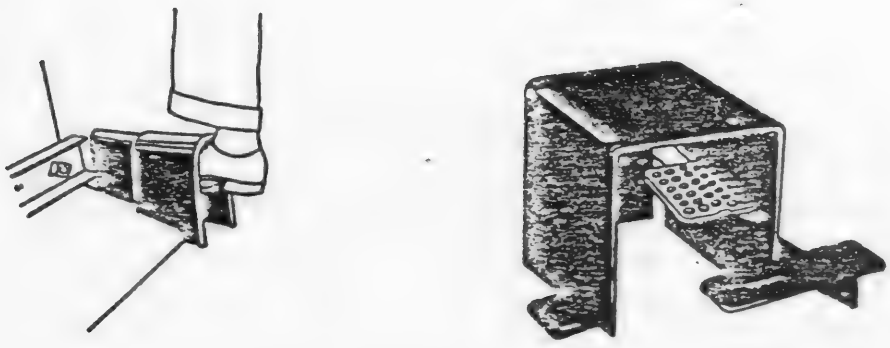


Enclosure guards for punching or forming presses for use with dial or strip feeding.

Guarding Shearing Action by Enclosure Guards

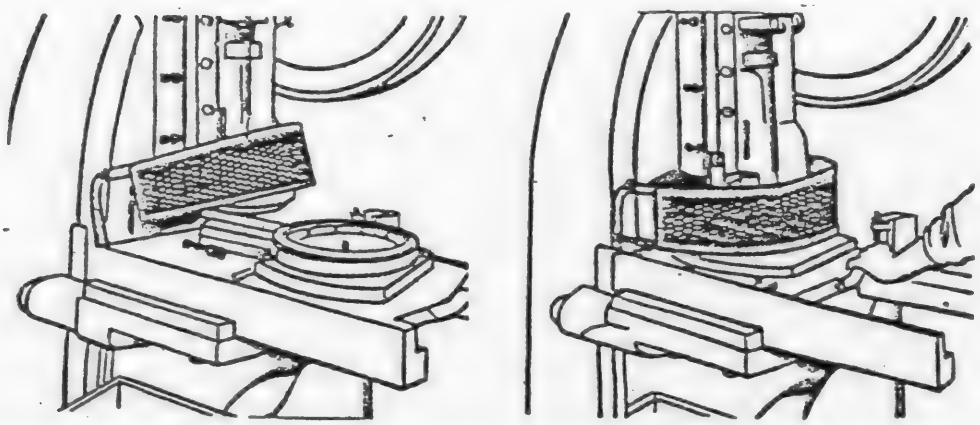


Enclosure guards for alligator shears.

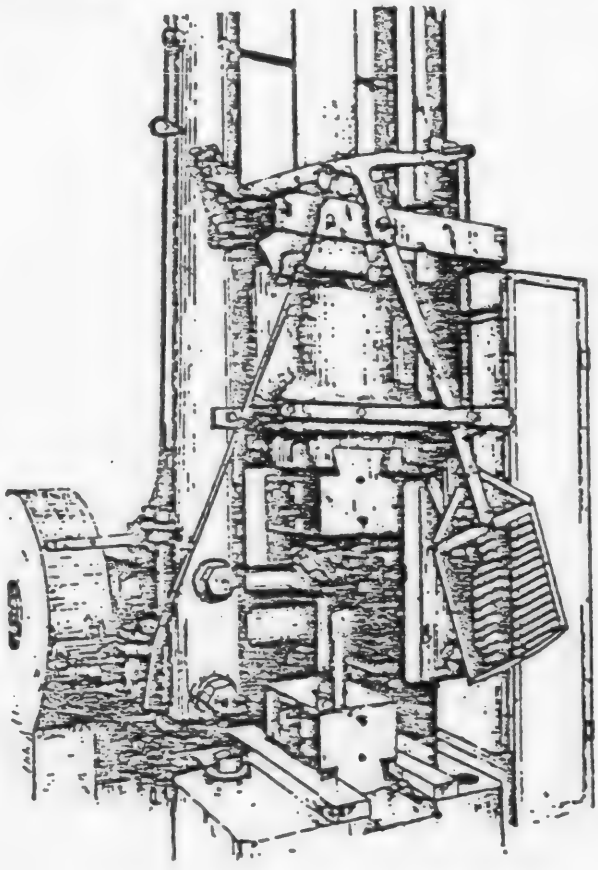


Treadle guards for presses and shears to prevent unintentional tripping.

Guarding Punching or Bending Actions by Barrier Guards



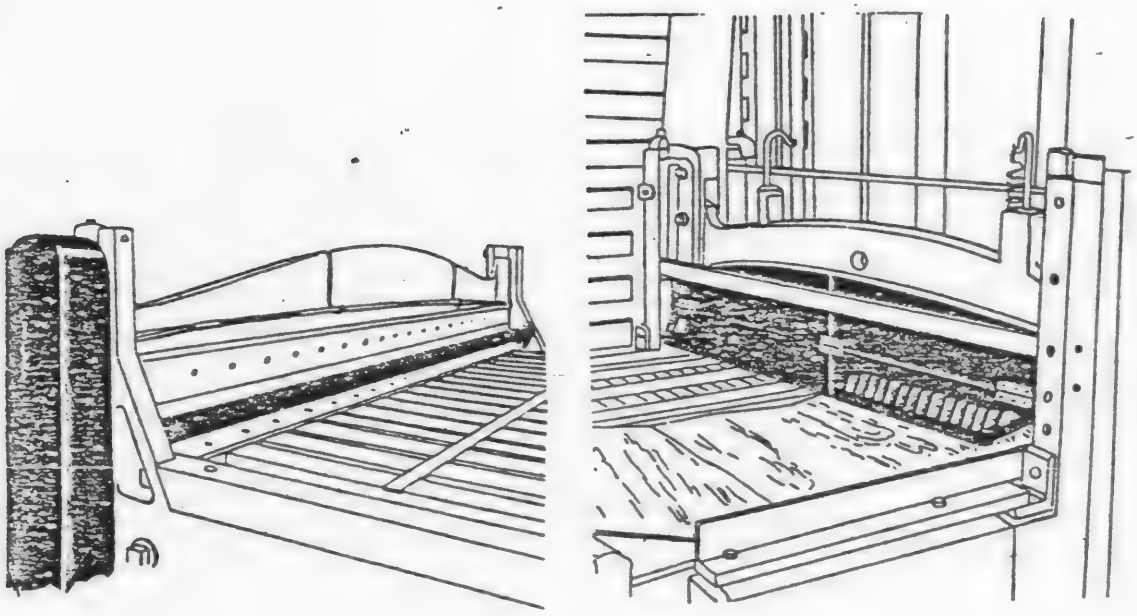
Stock is fed into die outside of danger zone. Hinged barrier guard closes automatically when sliding die is moved into position.



A barrier guard, operated by the tripping device of the press, is interposed in front of the plunger before the plunger descends.

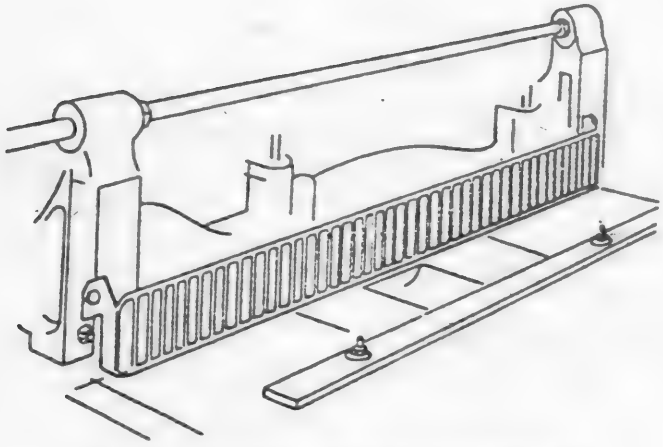
BARRIER GUARD ON PUNCH PRESSES

Guarding Shearing Action by Barrier Guards



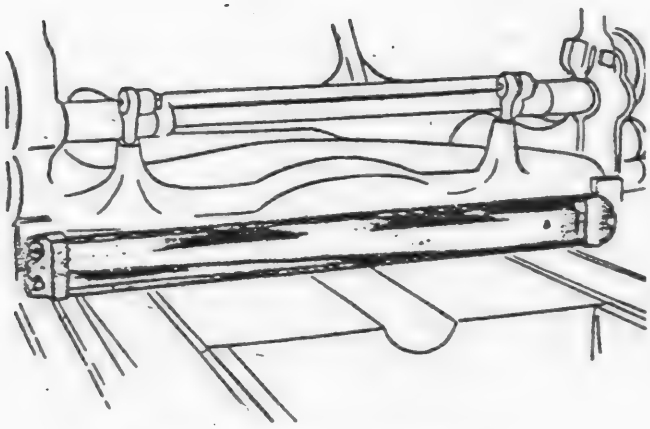
Back side Front side

Barrier guard for veneer clipper.

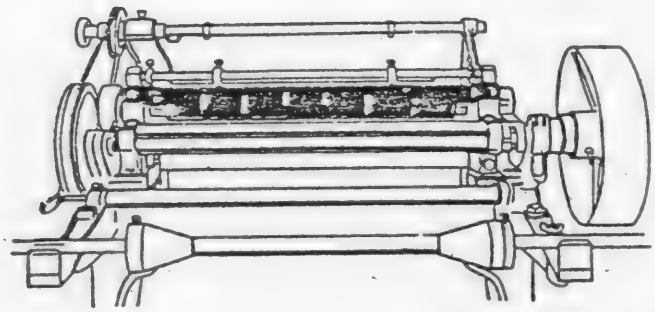


Adjustable barrier guard for feed side of squaring shear.

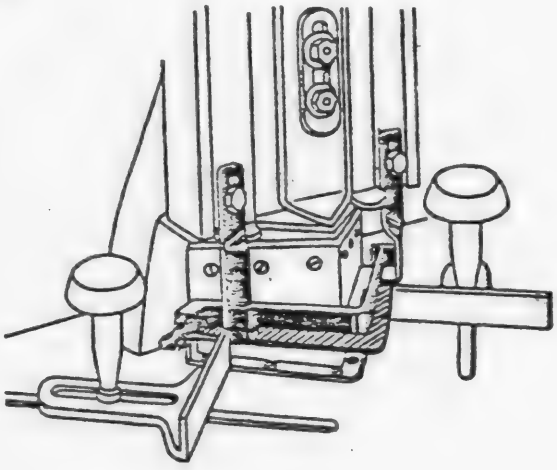
Guarding Shearing Action by Barrier Guards



Fixed transparent barrier guard for shear.

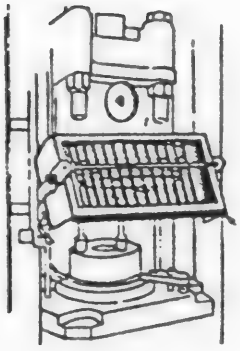


Barrier guard on feed side of paper slitter.

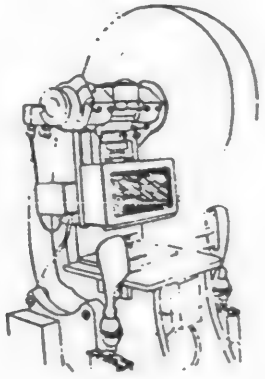


Barrier guard on paper corner cutter.

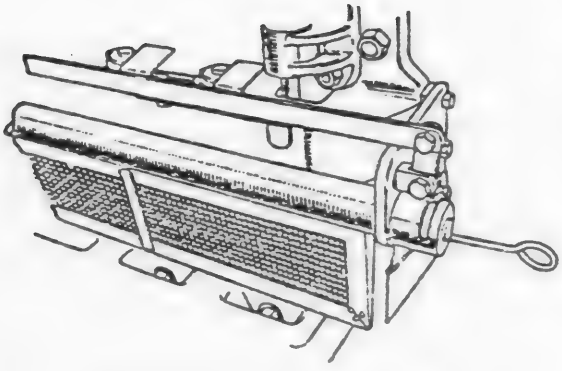
Guarding Punching or Bending Actions by Interlocking Guards



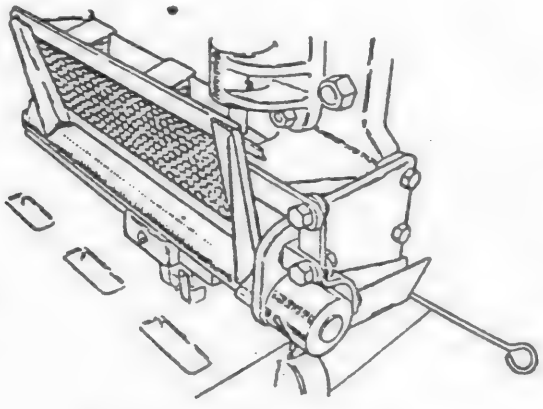
Gate guard on punch press. Guard is interlocked with tripping device of press so that plunger cannot descend until gate is in closed position.



Photoelectric relay (electric eye) prevents operation of press while operator's hands are in the danger zone. Should not be used on positive clutch presses where ram continues its stroke after tripping of press.



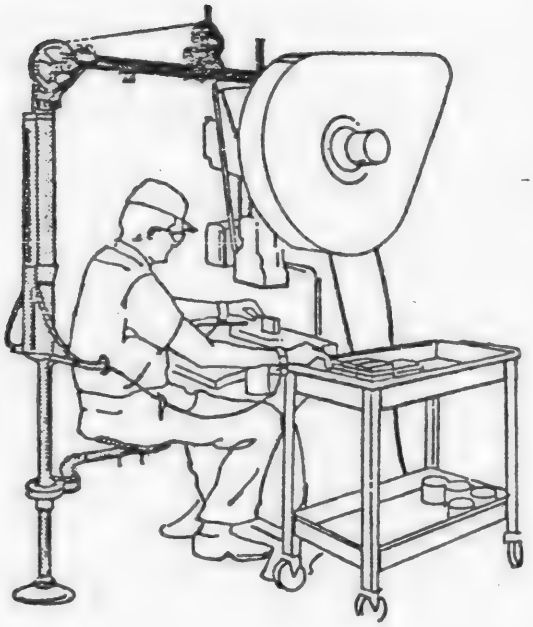
Guard closed, starting control accessible.



Guard open, starting control inaccessible.

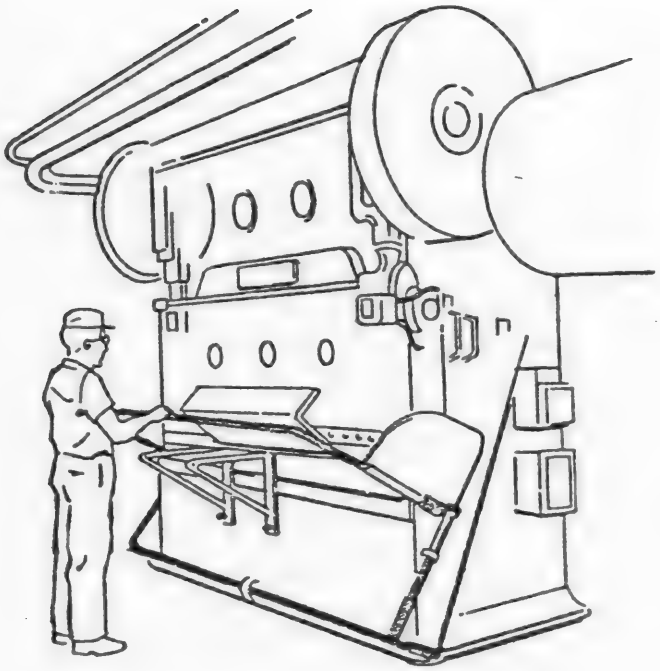
GUILLOTINE SHEAR EQUIPPED WITH TWO-HANDED CONTROL INTERLOCKED WITH BARRIER GUARD

Guarding Punching or Bending Actions by Automatic Guards

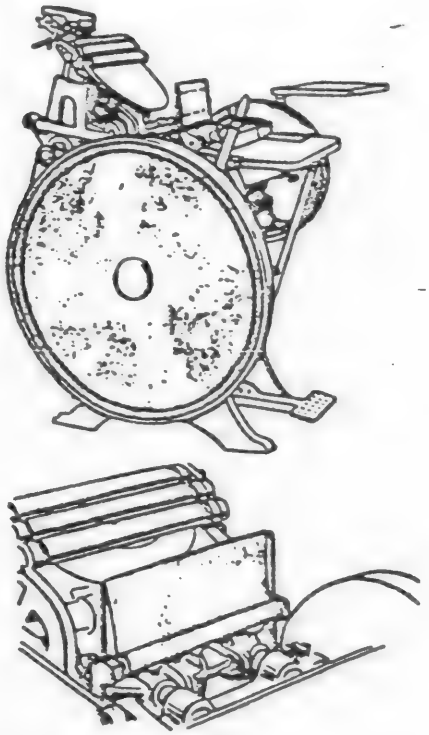


Pull-away guard. Operator's hands are pulled away from danger zone before ram descends.

Guarding Punching and Bending Actions by Automatic Guards



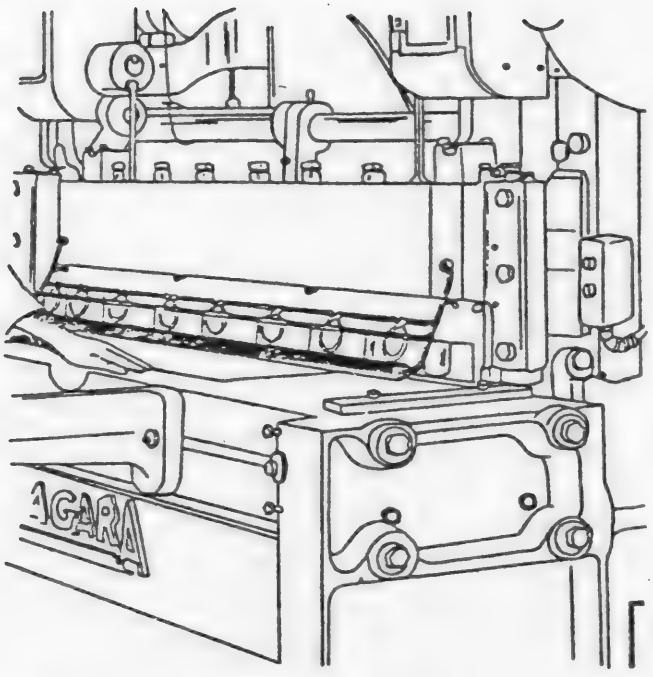
Power brake. Automatic device pushes operator away from danger zone when power brake is operated.



Platen press. Barrier guard, operated by the reciprocating crank, pushes operator's hands out of danger zone when press closes.

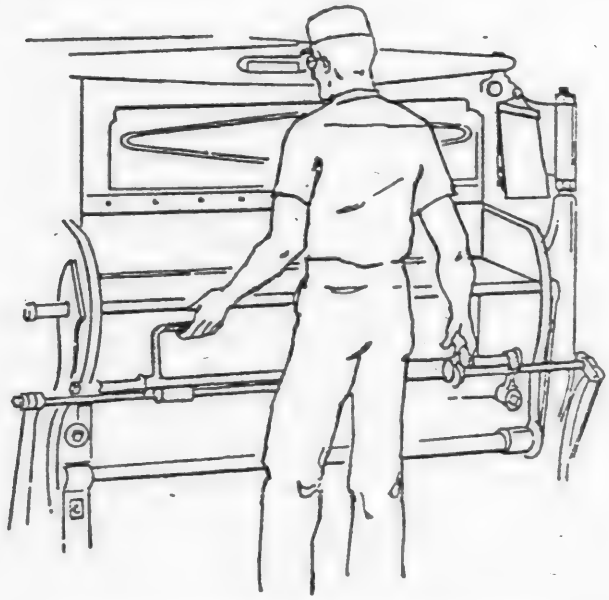
GUARDING BRAKES AND PRESSES BY AUTOMATIC PUSH-AWAY GUARDS

Guarding Shearing Action by Automatic Guards

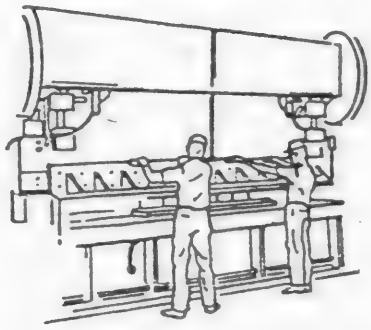


Power shears. Roller guard rests on sheet stock as it is fed into the shear. Descending ram will force roller out, and roller pushes operator's hands away from knife. When ram ascends, roller will rest in vertical position.

Guarding Shearing Action by Remote Control Placement, Feeding or Ejection

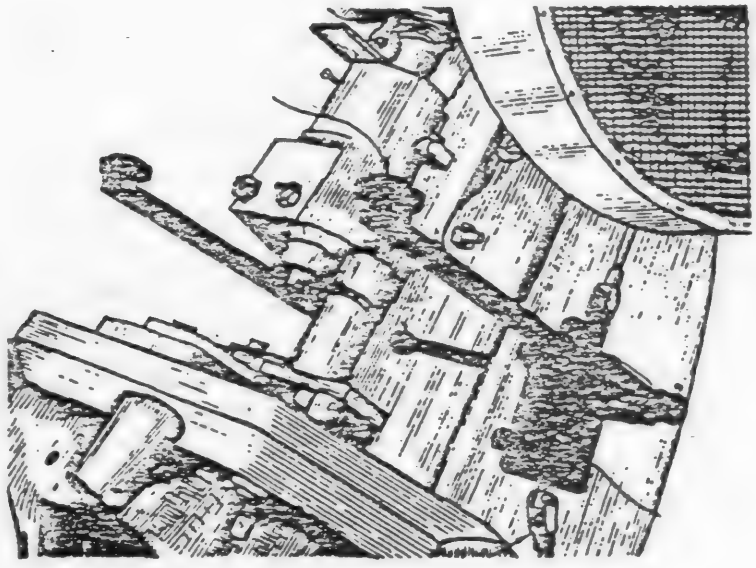


Two-handed tripping device for paper guillotine shear.

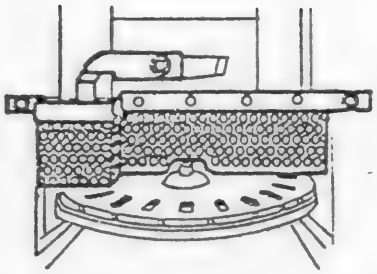


Two-man operated press with each operator required to activate two switches simultaneously.

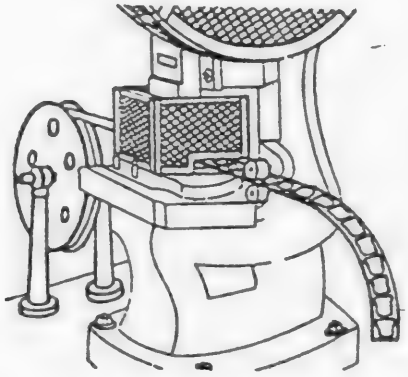
Punch press. Two-handed tripping device requires the simultaneous use of both hands to trip the press. On presses with noninterrupting stroke, device should require continuous pressure on controls so that operator cannot reach into the press.



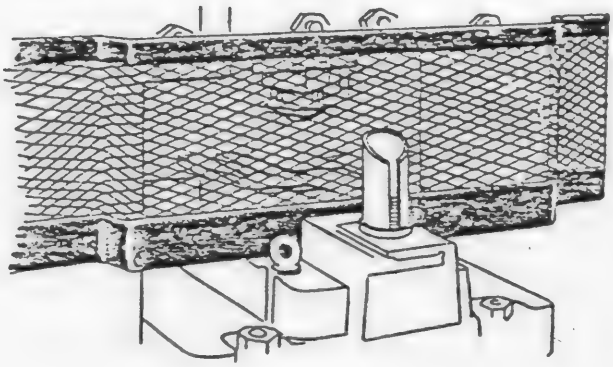
Guarding Punching Action by Remote Control, Feeding or Ejection

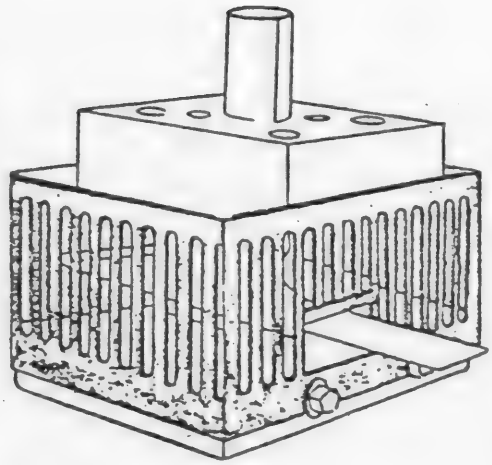


Rotating die. Stock is fed manually into rotating die and is carried automatically under the plunger.



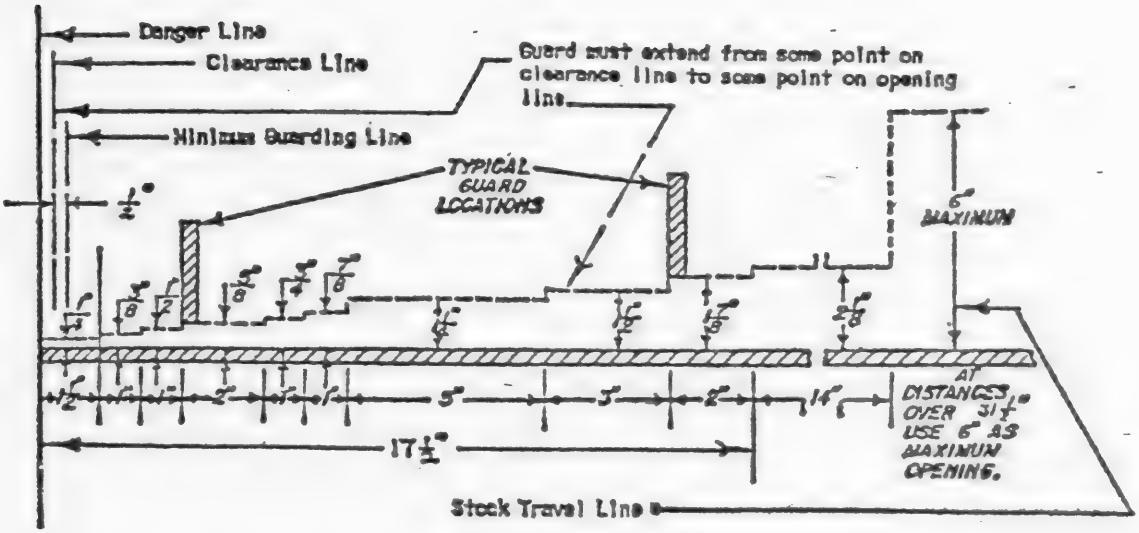
Automatic feed. Stock is fed automatically to plunger, operator required only to restock feeding device.





Other types of enclosure guards for use with automatic feeding.

Guarding Punching Action by Remote Control, Feeding or Ejection


Danger Line
Clearance Line
Guard must extend from some point on clearance line to some point on opening line.
Minimum Guarding Line
TYPICAL GUARD LOCATIONS
1/2"
6" MAXIMUM
AT DISTANCES OVER 31/2" USE 6" AS MAXIMUM OPENING.
17 1/2"
Stock Travel Line

Explanation of above diagram:

This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation).

The *clearance line* marks the distance required to prevent contact between guard and moving parts.

The *minimum guarding line* is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line.

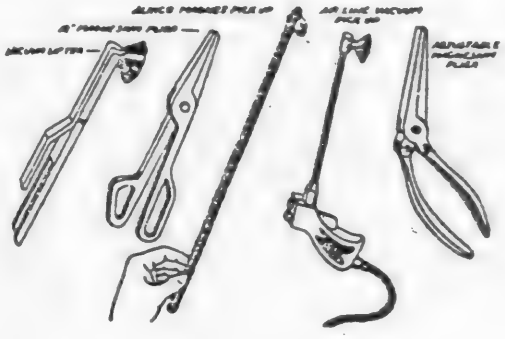
The various openings are such that for average size hands an operator's fingers won't reach the point of operation.

After installation of point of operation guards and before a job is released for operation a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation.

Table O–10

Distance of opening from point of operation hazard (inches)	*Maximum width of opening (inches)*
½ to 1½	¼
1½ to 2½	⅜
2½ to 3½	½
3½ to 5½	⅝
5½ to 6½	¾
6½ to 7½	⅞
7½ to 12½	1¼
12½ to 15½	1½
15½ to 17½	1⅞
17½ to 31½	2⅛

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.



Guarding by the use of special tools. The use of specially designed hand-tools for placing material into the press is also acceptable.

D. Guard Construction and Specifications

Machine guards to be effective must be built in accordance with recognized standards of construction and of performance. They must be designed so as to eliminate the hazard; they must create no hazard of their own; they must be sturdy enough to withstand normal wear; and they should not interfere with production.

Refer to Appendix B for information on specifications available for particular machinery items or machine groupings.

The general specifications listed below may be used as guidelines in constructing enclosure or barrier-type safeguarding devices to meet the requirements of §1910.213.

Size of Framework Materials

(1) Minimum dimensions of materials for the framework of all guards except as noted in paragraph 3 shall be angle iron 1 inch × 1 inch × ⅛ inch, metal pipe of ¾ inch inside diameter or metal construction of equivalent strength.

All guards shall be rigidly braced every 3 feet or fractional part of their height to some fixed part of machinery or building structure. Where guard is exposed to contact with moving equipment, additional strength may be necessary.

(2) The framework for all guards fastened to floor or working platform and without other support or bracing shall consist of 1½ inch × 1½ inch × ⅛ inch angle iron, metal pipe of 1½ inch inside diameter or metal construction of equivalent strength. All rectangular guards shall have at least four upright frame members each of which shall be carried to the floor and be securely fastened thereto.

Cylindrical guards shall have at least three supporting members carried to floor.

(3) Guards 30 inches or less in height and with a total surface area not in excess of 10 square feet may have a framework of ⅜ inch solid rod, ¾ inch × ⅜ inch × ⅛ inch angle or metal construction of equivalent strength.

Size of Filler Materials

Material	Clearance from moving part at all points	Largest mesh or opening allowable	Minimum gage (U.S. standard) or thickness	Minimum height of guard from floor or platform level
	(Inches)	*(Inches)*		*Feet-Inches*
Woven wire	Under 2	½	No. 16	7–0
	2–4	½	No. 16	7–0
	Under 4	½	No. 16	7–0
	4–15	2	No. 12	7–0
Expanded metal	Under 4	½	No. 18	7–0
	4–15	2	No. 13	7–0
Perforated metal	Under 4	½	No. 20	7–0
	4–15	2	No. 14	7–0
Sheet metal	Under 4		No. 22	7–0
	4–15		No. 22	7–0
Wood or metal strip crossed	Under 4	⅝	Wood ¾ inch or Metal No. 16	7–0
	4–15	2		
Wood or metal strip not crossed	Under 4	½ width		
	4–15	1 width		
Standard rail	Minimum 15			
	Maximum 20			

Method of Fastening Filler to Frame

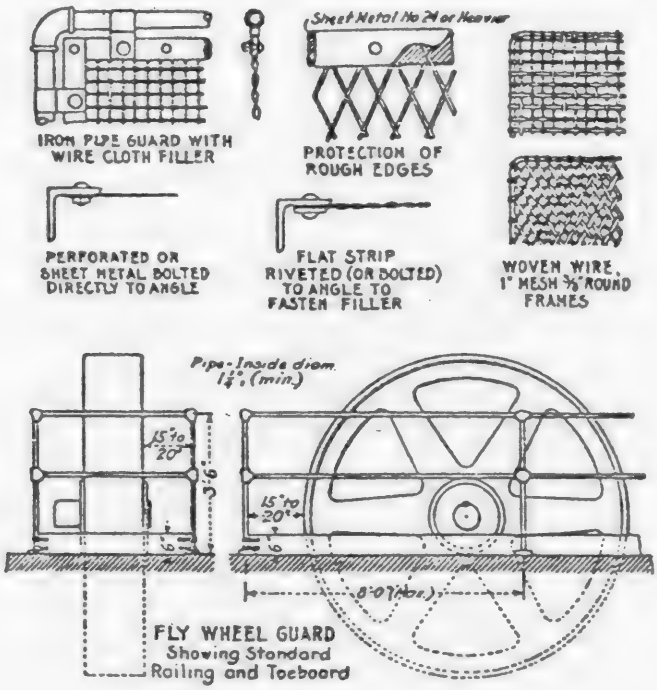
(1) With rivets or bolts spaced not more than 5 inches center to center. In case of expanded metal or wire mesh, metal strips or clips shall be used to form a washer for rivets or bolts.

(2) By welding to frame every 4 inches.

(3) By weaving through channel or angle frame; or if No. 14 gage ¾ inch mesh or heavier is used, by bending entirely around rod frames.

(4) Where openings in pipe railing are to be filled in with expanded metal, wire mesh, or sheet metal, the filler material shall be made into panels with rolled edges or bound with "V" or "U" edging of No. 24 gage or heavier sheet metal fastened to the panels with bolts or rivets spaced not more than 5 inches center to center. The bound panels shall be fastened to the railing by sheet-metal clips spaced not more than 5 inches center to center.

Note: Diamond or square mesh made of crimped wire fastened into channels, angle or round-iron frames, may also be used as a filler in guards.


IRON PIPE GUARD WITH WIRE CLOTH FILLER
Sheet Metal No 24 or Heavier
PROTECTION OF ROUGH EDGES
PERFORATED OR SHEET METAL BOLTED DIRECTLY TO ANGLE
FLAT STRIP RIVETED (OR BOLTED) TO ANGLE TO FASTEN FILLER
WOVEN WIRE, 1" MESH ⅜" ROUND FRAMES
Pipe-Inside diam. 1¼" (min.)
15° to 20°
15° to 20°
FLY WHEEL GUARD
Showing Standard Railing and Toeboard

Acceptable Guard Construction.

VOLUNTARY ANSI STANDARDS

This section of the Appendix lists 22 ANSI standards, relevant to machine guarding, which have not been reviewed or adopted by OSHA. They are listed solely for informational purposes, and no approval by OSHA of these standards is intended by their conclusion in this Appendix.

(1)	ANSI B11. 13-1975	Automatic Screw Bar and Chucking Machines, Safety Requirements for Construction, Care, and Use of Single and Multiple Spindle
(2)	ANSI B153.1-1974	Automotive Lifts, Safety Requirements for Construction, Care, and Use of
(3)	ANSI B11. 7-1974	Cold Headers and Cold Formers, Safety Requirements for Construction, Care, and Use of
(4)	ANSI B20.1-1972	Conveyors and Related Equipment, Safety Standards for
(5)	ANSI B152.11-1973	Die Casting Machines, Safety Requirements for Construction, Care and Use of
(6)	ANSI B11.8-1974	Drilling, Milling, and Boring Machines, Safety Requirements for Construction, Care and Use of
(7)	ANSI B169.1-1975	Envelope Manufacturing Equipment, Safety Requirements for
(8)	ANSI B11.9-1975	Grinding Machines, Safety Requirements for Construction, Care, and Use of
(9)	ANSI B11.5-1975	Iron Workers, Safety Requirements for Construction, Care and Use of
(10)	ANSI B11.6-1975	Lathes, Safety Requirements for Construction Care, and Use of
(11)	ANSI B11.10-1974	Metal Cutting Saws, Safety Requirements for Construction, Care, and Use of
(12)	ANSI Z268.1-1974	Metal Scrap Processing Equipment, Safety Requirements for
(13)	ANSI Z259.1-1974	Paper Bag and Sack Manufacture, Minimum Safety and Health Requirements for

(14) ANSI B11.3-1973	Power Press Brakes, Safety Requirements for Construction, Care, and Use of
(15) ANSI B155.1-1973	Packaging and Packaging Related Converting Machinery, Safety Requirements for
(16) ANSI Z245.1-1975	Refuse Collection Equipment, Safety Requirements for
(17) ANSI B154.1-1974	Rivet Setting Equipment, Safety Requirements for Construction, Care, and Use of
(18) ANSI Z241.1-1975	Sand Preparation, Molding, and Core Making in the Sand Foundry Industry, Safety Requirements for
(19) ANSI B157.1-1974	Scales, Weighing Machines, and Weighing Systems, Safety Requirements for
(20) ANSI B11.4-1973	Shears, Safety Requirements for Construction, Care and Use of
(21) ANSI Z229.1-1973	Shops Fabricating Structural Steel, Safety Requirements for
(22) ANSI B177.1-1975	Three Roller Printing Ink Mills, Safety Requirements for

APPENDIX B

Regulatory Guide on Specification Provisions

[To contain revised OSHA machine guarding standards, s1910.213 through s1910.219. See the accompanying notice for these standards and for a description of how to provide comment to OSHA on their revision.]

[FR Doc.77-100 Filed 1-6-77;8:45 am]

[29 CFR Part 1910]

[Docket 0–1]

MACHINERY AND MACHINE GUARDING

Request for Information on Technical Issues

The Occupational Safety and Health Administration (OSHA) is considering revising Subpart O of Title 29, Code of Federal Regulations, Part 1910, which establishes standards relating to machinery and machine guarding. These standards contain general requirements for the guarding of machinery (§ 1910.212), and specific requirements for woodworking machinery (§ 1910.213), cooperage machinery (§ 1910.214), abrasive wheel machinery (§ 1910.215), mills and calendars in the rubber and plastics industries (§ 1910.216), mechanical power presses (§ 1910.217), forging machines (§ 1910.218) and mechanical power-transmission apparatus (§ 1910.219).

This notice is intended to solicit data necessary for the revision of Subpart O, and to provide the public an early opportunity to participate in the review of the existing standards by inviting public comments on the scope and form that possible revisions of Subpart O of Part 1910 should take. In addition to inviting the submission of written comments and data, the notice announces the scheduling of informal information-gathering meetings to permit oral presentation of data and information to OSHA.

This notice is issued in accordance with OSHA's new procedure announced in the FEDERAL REGISTER on April 23, 1976 (41 FR 17100) for the revision of safety standards originally promulgated pursuant to section 6(a) of the Occupational Safety and Health Act of 1970 (84 Stat. 1593, 29 U.S.C. 655). That notice stated, among other things, that OSHA would announce individually the standards to which the new procedure would apply. OSHA has now decided to apply this new procedure in revising Subpart O of Part 1910.

I. BACKGROUND

The existing Subpart O became effective on August 27, 1971, and February 15, 1972, after promulgation pursuant to section 6(a) of the Act, which allowed OSHA during a two-year period ending on April 28, 1973, to promulgate national consensus standards and federally established standards without public comment or hearing. Subpart O was derived primarily from the then existing national consensus standards published by the American National Standards Institute (ANSI) and in part on established Federal standards issued under the authority of the Walsh-Healey Act (41 U.S.C. 35). Subsequently, OSHA amended particular paragraphs of §§ 1910.211 and 1910.217 (36 FR 157, 8/13/71; 37 FR 23718, 11/8/72; 38 FR 16223, 6/21/73; 39 FR 41841, 12/3/74; 40 FR 3982, 1/27/75.) Experience since promulgation of Subpart O has indicated many difficulties in the application of certain specific requirements of this subpart. Additionally, it has been suggested that particular requirements have no direct effect upon the safety of employees, that many details are such as to directly concern only the manufacturer of machinery, and that there may be areas where current technology has surpassed existing requirements with the result that the present Subpart O may no longer be an effective means of providing the employee safety intended by the Act. Finally, the provisions of many of the ANSI standards on which Subpart O was based have been changed and OSHA has been petitioned to modify its standards accordingly.

On April 23, 1976, when OSHA announced its new procedure for the revision of safety standards, OSHA solicited public participation in the development of new approaches to OSHA's safety standards. In today's issue of the FEDERAL REGISTER (42 FR 1742), one possible approach to revising Subpart O is discussed. If OSHA were to adopt that suggested approach, the standards of Subpart O would need to be revised to conform to that approach. In any event, however, there is a need to consider revision of the standards comprising Subpart O. In this effort to review and revise the various provisions of Subpart O, OSHA invites the full participation of the public.

II. THE ISSUES

(a) *General issues.* As discussed in the Notice of New Procedures for Revision of Safety Standards (41 FR 17100), there are certain issues which have been raised that are common to many of the standards promulgated under section 6(a) of the Act. These issues, as applied to Subpart O, are set forth below:

1. Whether particular provisions of Subpart O should set forth specifications which must be met by employers or should, rather, require a level of performance or the achievement of a goal which would ensure employee safety without requiring specific means of meeting that performance level. For example, the requirement in § 1910.216(c)(1) that "safety tripping devices shall be located within reach of the operator and the bite" has been criticized for not informing employers of the distances at which these safety devices should be installed. On the other hand, sections 1910.213–1910.219 of Subpart O set forth detailed specifications for the design and construction of guards on particular machines without allowing for differences in design or material either on existing machinery or on machines which are built subsequent to promulgation of the standard, and without providing for subsequent advances in new technology. Many of these differences, if allowed, might not materially affect the safety of employees. Should a revised Subpart O explicitly permit equipment which provides safety substantially equivalent to the established standard by requiring the employer to meet a level of performance rather than design specifications?

Related to the question of whether particular provisions of the standards in §§ 1910.213–1910.219 should contain specifications or should be performance oriented, is the broader question of whether all machines should be covered by the same performance requirements, such as the requirement in the existing § 1910.212. This question is discussed at length in a notice of a suggested approach to Subpart O published in today's issue of the FEDERAL REGISTER (42 FR 1742). If any performance approach is adopted—whether it is the suggested approach, an expanded § 1910.212, or any other overall performance requirement—should the standard also include recommended means or alternatives, showing details of design, material and construction, which would constitute one way but not necessarily the only way of meeting the performance requirements of the standard?

2. Whether particular provisions of Subpart O should be revoked because they are of marginal value in terms of employee safety or because they are directed to protection of equipment or property rather than employees. For example, § 1910.219(o)(3)(iii) requires that overhead belt guards "shall be at least one-quarter wider than the belt which they protect." Should this requirement be revoked on that view that it is primarily designed to prevent abrasion of the belt and thus extend its life rather than prevent exposure of employees to the belt which can create a hazard and result in injury. As another example, § 1910.217(f)(4) requires employers to operate mechanical power presses "within the tonnage and attachment weight ratings, specified by the manufacturer." Does this section have any relevance to employee safety: To what extent are there requirements in Subpart O that have little, if any, relevance to employee safety?

3. Whether there are gaps in coverage in Subpart O that give rise to unsafe conditions for employees, and how these gaps should be remedied? There are 22 ANSI standards covering machine groups for which there are no OSHA counterpart specification standards. As just one example, ANSI B.11.6–1975 contains detailed safety requirements for the construction, care and use of lathes, whereas Subpart O specification standards do not cover lathes. Should lathes be subject to specific requirements? If so, how should the point of operation of lathes be guarded? Should any of the other ANSI machine groups be covered by specific requirements or should these machine groups be subject only to the general guarding requirements of § 1910.212? (A list of the ANSI machine standards is available in Appendix A of the notice on the suggested approach to Subpart O in today's issue of the FEDERAL REGISTER at page 1742). Do particular machine groups present greater hazards to employees than other machine groups? What injury data showing frequency, severity and cause of injury are available?

In addition to gaps created by the lack of specification standards for particular machine groups, are there gaps in coverage of the individual specification standards of §§ 1910.213–1910.219 of Subpart O. For example, bung—boring ma-

chines are not covered by the cooperage standard in § 1910.214. What other gaps are there which deprive employees of needed protection?

4. Whether particular provisions of the existing standards need simplification or clarification? For example, should the definition of flanges in § 1910.211(b)(9) be clarified by substituting in that definition "straight relieved or straight unrelieved types" for the words "back up type"?

5. How should ANSI standards be utilized in these OSHA regulations? If an ANSI standard is referred to, either in connection with legally binding requirements or with recommended means of compliance, should it be done merely by reference to an ANSI standard or should it be done by reprinting the relevant text of that standard in the OSHA regulation? In considering this question, it should be recognized that the specifications dealing with machinery and machine guarding are voluminous. What, if anything, should be done as the ANSI standards are periodically updated?

(b) *Specific issues.* In addition to the above general issues, OSHA invites comments on specific issues relating to Subpart O. OSHA's paragraph-by-paragraph presentation of comments and requests for revision raises a number of specific issues. Some of these issues apply across the board to all standards in Subpart O, and it is to these that the attention of the interested public is particularly directed. These issues are:

1. *Scope:* (a) Whether there is a need for a scope provision which clearly identifies the machines covered and excluded from Subpart O, so as to avoid possible confusion with machinery that is covered by Subpart F (Powered Platforms, Manlifts and Vehicle-Mounted Work Platforms), Subpart M (Compressed Gas and Compressed Air Equipment), Subpart N (Materials Handling and Storage), Subpart P (Hand and Portable Powered Tools and Other Hand-Held Equipment), Subpart Q (Welding, Cutting and Brazing) and Subpart R (Special Industries)? What type of machinery should be covered by Subpart O? What equipment should be excluded? Should elevators, vehicles and food processing equipment be excluded?

(b) Whether there is a need for a scope section for each of the specification standards (§§ 1910.213–1910.219) of Subpart O in order to clarify the coverage of each of these standards. For example, a scope section for § 1910.213 would indicate whether the requirements of that section applied to woodworking saws cutting materials other than wood.

2. *Guard materials:* Whether Subpart O should universally allow the use of guards made from all materials which are of equivalent strength, impact resistance and rigidity. Should a strength specification be required for construction of guards or would performance criteria be sufficient if such criteria identified the hazard to protect against? Particular provisions of Subpart O specification standards, such as § 1910.219 (h)(1) require metal guards. Other sections, such as §§ 1910.215(b)(10) and 1910.219 (m)(2) specify the allowable types of metal. Should OSHA allow guards constructed of other materials? In which situations would employee safety necessitate limiting the materials from which a guard can be constructed?

3. *Lockouts:* Should lockout be required when machinery is not in normal operating mode, or should alternative methods for employee protection, such as tag-out, be permitted? One of the most common hazards of machinery is unintended operation or movement during set-up, maintenance, repair, inspection, and testing. Many current OSHA or voluntary standards direct their major emphasis at machinery operator safety while performing normal operations. A few standards do make special provision for the safety of other than the operator when machinery is not in normal operating mode. The need to disable machinery using more than the normal stop or shutdown controls has resulted in the development of systems for lockout of machine actuation controls. Some methods of lockout are: the use of locks; plugging of piping or tubing; disconnect of power by removal of electric plug; operating mode, control key-locked selector; electrical fuse removal; or wiring disconnect. The substitution of a tag in lieu of positive lock or seal is used by some industries which can police and enforce the tagging rule. A combination lock and tag is sometimes used to enable ready identification of the person or craft which secured the machine and attached the identifying tag. A review of the newer voluntary standards for machine tools discloses that provisions for facilitating locking out and/or tagging are now incorporated in the requirements for machine actuating controls or main power supply. In the case of controls it is possible to provide restrictions which would not necessarily completely disable a machine. Some examples of more limited forms of machine energy control are die safety blocks, ram blocks, machine mode selector (for jog using flywheel bar or inch using separate control circuits) or actuating button performance characteristics (continuous, single, inch, jog).

What are the characteristics of a machine, for example size, tooling, power train, control system, prime mover (electrical, air, hydraulic), which would require that a means of securing power to prevent motion either by lockout or tagout or some other alternative method be provided? What criteria should be used to determine which types of machines should be capable of lockout and/or tagging for purposes of employee safety? What machines should be exempted from any lockout and/or tagging requirements, i.e., machines provided with cord and plug power connector? What machine characteristics distinguish those which should be provided with a means for accomplishing lockout from those that could be tagged out? Should limitations be placed on the acceptability of certain methods for securing power, such as tagging or operating mode selectors? OSHA solicits detailed information as to lockout, tag-out and any alternative methods for securing power. Experience with particular methods, as well as detailed injury data, is requested.

4. *Equipment design responsibility.* What responsibility, if any, as to the design and construction of new equipment and the modification of existing equipment can reasonably be placed on an employer?

5. *Passerby protection.* Should guarding requirements address hazards to the operator only or should they be designed to also protect employees at adjacent machines or passageways?

6. *Inspection and maintenance.* Is there a need to require machine inspection and maintenance of all machinery or should inspection and maintenance programs be required only for such inherently dangerous machines as mechanical power presses? What are the requirements which should be applied to all machinery? To particular machinery? What should constitute maintenance: oiling a machine, changing the abrasive wheel of a simple pedestal grinder with a sealed-bearing motor?

7. *Training.* Should operator training programs be required? If so, what should be the contents of such programs?

8. *Guarding by location.* Whether guarding by location should be recognized as a safeguarding method meeting the requirements of § 1910.212? If so, under what circumstances should additional guarding be required? Some of the ways in which guarding by location may be accomplished are: installation of machinery at heights above the reach of employees; locating a machine behind a partition or solid barrier which protects the operator and other employees in the area; designing other machine components around the hazardous part of the machine so as to prevent the operator from reaching through, over, under or around the hazardous area; restricting access by placement of pedestrian type barriers, fencing, cables or guardrails; restricting access through use of an electrically interlocked gate which has a control that stops operation of the machine upon opening of the gate and has a reset button, located outside of the barrier, which must be activated before machine operations are resumed; and locating machine controls at an operator's station which is protected from the hazards of the machine either because the operator controls are remotely located in a cab, platform, pulpit or fixed seat, or because the controls are provided with devices such as presence sensing mats or continuous pressure switches. Some of these methods protect only the operator of the machine, and some protect the operator and other employees in the area. Should guarding by location be permitted only when it protects all employees in the area during normal operation of the machine? Should guarding by location not be acceptable during other than normal operation of the machines, such as servicing, maintenance or testing of equipment? Maintenance employees need to enter areas barred to regular em-

ployees to operate the machine, or a part thereof, in order to service or repair it. Guarding by location may not be an effective safeguard in such situations.

OSHA solicits information on these questions and also on all methods of guarding by location currently in use. Specific information is requested on the circumstances in which each method is used and on specific requirements which should attach to each method.

(c) Additional Issues. Other specific issues, which pertain to patricular sections of the existing Subpart O are also raised in the columnar document. Some of these issues are:

1. § *1910.211* (*Definitions*). Whether there should be one definition of "point of operation" which would be applicable to all machines covered by Subpart O? The existing standard defines "point of operation(s)" for woodworking and cooperage machines (§ 1910.211(a)(1)), for mechanical power presses (§ 1910.211(d)(45)), for mechanical power transmission apparatus (§ 1910.211(f)(8)), and for machinery in general (§ 1910.212(a)(3)). (In this connection, it should be noted that OSHA contemplates, in revising the standard, to include the definitions applicable to particular types of machinery within the same standard as the requirements for that machinery, and to retain in a general definitions section, such as § 1910.211, only definitions applicable to all types of machinery.)

2. § *1910.212 General requirements for all machines.* (a) Whether § 1910.211 should be expanded to afford greater protection to employees? Should this section cover hazards, other than point of operation hazards, such as electrical hazards, hazards of machine installation, and hazardous workpieces? Should employers be required to replace dull or damaged tools or machine parts to protect employees from the hazards created thereby? Should § 1910.212 be expanded to include requirements for machinery other than those requirements for guarding and anchoring? Should OSHA require, for example, that operator actuated controls be located within easy reach of the operator's work station in order to eliminate the need for the operator to reach over or into a hazardous area to start, stop or adjust the machine? Should emergency stop controls be required near the point of operation, and, if so, under what conditions? If control requirements should be included, to what extent do such controls exist on machinery currently in use? If such controls do not currently exist, to what extent would they be feasible for all types and sizes of machines; does the technology exist to design such controls so that they do not interfere with normal operation of the machine or would an across the board requirement mean that particular machines would be outlawed? If employers are required to retrofit, what would be a reasonable period of time to accomplish this retrofitting on particular types of machines? Should special requirements be applicable where existing machinery is modified or is used other than for its intended purpose? What should such requirements include?

(b) Whether there is a need to clarify the machine guarding methods which meet the requirements of § 1910.212? Should particular safeguarding methods be required for particular hazards or for particular machines, or should an employer be allowed the option of selecting any kind of safeguarding method, including safeguarding by location, shield or barrier, which he feels is adequate to protect against the hazard created by his machine in his workplace?

(c) Is additional guidance necessary so that employers are informed on how to meet the level of performance required by § 1910.212? Should a list of industry consensus standards be developed for this purpose?

(d) Whether fan blade exposure requirements more properly should be treated in Subpart P which contains standards for portable power tools and equipment? Should different requirements apply to fans depending on whether they are used for employee comfort cooling or process air movement? Should the size of the guard opening vary depending on the distance of the guard from the blade of the fan?

3. § *1910.213 Woodworking machinery.* (a) What should be the scope of this standard? Should the structural plywood industry be included or excluded from coverage by this section? To what extent is the woodworking machinery currently described in § 1910.213 used in the structural plywood industry? What particular provisions of § 1910.213 present conflicts for sawmill operations covered by § 1910.265 of Part 1910?

(b) Whether particular terms used in the standard should be defined and, if so, how should they be defined? For example, how should "swing-head lathes" used in both § 1910.213(o) and the ANSI source standard (ANSI) 01.1–1975) be defined? OSHA solicits information, particularly from woodworking machine tool manufacturers and users, as to the machine equipment terms used through § 1910.213. Comment is also requested on whether particular terminology in the standard is outdated or is commonly used only in particular industries. For example, § 1910.213 refers to "drag saws." The ANSI source standard refers to the same equipment as "log cut-off saws." Which is the more universal term? Paragraph (q) of § 1910.213 includes the term "veneer wringers" in its title. The ANSI source standard does not mention "veneer wringers." Should this term be included?

(c) Should the standard allow the use of a fixed or manually adjusted blade guard in place of an automatically adjustable guard on a circular hand fed ripsaw? What clearance dimensions between the fixed or manually adjusted guard and the work piece should be established in order to provide sufficient operator protection?

(d) Should the standard mandate braking on all woodworking machines where a coasting saw blade might expose employees to a hazard, and if so, what design specifications or performance criteria should be required to effectively control the hazard exposure?

(e) Is there a need to require the marking of saw blades to ensure the use of correct operating speed on woodworking machines?

(f) What problems and what hazards occur when using lower blade guards on radial arm saws for universal application? Are there any commercially available lower blade guards which will permit unrestricted operation for bevel and compound cuts, and if not, what methods other than lower blade guards can be used which will afford equivalent operator protection?

4. § *1910.214 Cooperage machinery.* (a) whether there is need for a separate cooperage standard or whether cooperage should be covered, as in ANSI 01.1–1975, by the same standard as woodworking? To what extent are the same or similar machines used in both industries? Are the hazards different if a machine is used for cooperage or for other woodworking products? Data on the number of cooperage facilities and the number of persons employed at such facilities is requested.

(b) Whether requirements for additional cooperage machines, for example, hog mills, should be included in the standard?

5. §*1910.215 Abrasive wheel machinery.* (a) Whether this standard should also cover grinding operations using sandstone, pulpstone and abrasive coated discs of metal, wood, cloth, or paper?

(b) Whether particular design specifications for guards and flanges in paragraphs (b) and (c) of this standard are more restrictive than necessary for employee protection? For example, § 1910.215(a)(4) requires that work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch. Would larger openings, proportional to the size of the piece being ground, be more hazardous?

(c) Is there a need to include within this standard mandatory work practices, and, if so, what particular practices?

(d) Should specific rules regarding the use of personal protective equipment be included in this standard or would a reference to Subpart I, Part 1910 be sufficient? Since eye injury is said to be the most frequent type of injury associated with abrasive wheel machinery, what particular requirements should be incorporated in this standard to reduce the occurrence of eye injury?

6. § *1910.216 Mills and calendars in the rubber and plastics industries.* (a) Whether the requirements of § 1910.216 should apply to mills and calendars in industries other than the rubber and plastics industry?

(b) Whether installations of mills in the rubber and plastics industry, built prior to August 31, 1971, should be required to meet the 50-inch mill roll height requirements of section 1910.216(a)(4)? Injury data for such mills is solicited. What would be a reasonable length of time to allow for compliance by these older facilities?

7. § *1910.217 Mechanical power presses.* (a) Whether a scope and application statement based on ANSI B11.1–1971 should be added to this standard or a different scope be developed by OSHA? It has been suggested that there is much confusion regarding what machines constitute mechanical power presses covered by § 1910.217. This section does not apply to such presses as ironworkers, shears, press brakes, envelope making machinery, engraving presses, leather cutting presses, brick presses and welding presses. Should the list of the excluded machines be expanded to explicitly exclude these machines and others from application of the standard?

(b) Whether press brakes, operated for production and functioning as mechanical power presses, shoud be subject to the § 1910.217 standards? When a press brake machine is fitted with dies for a production run and fed by an operator, the press brake functions in the same manner as the mechanical power press and the operator is exposed to the same hazards as the operator of the mechanical power press.

(c) Should the construction requirements in § 1910.217(b) be deleted as being relevant only to press builders and rebuilders?

(d) Brake monitors are required to be used with certain forms of safeguarding for hands-in-dies presses. What problems if any have been experienced with the procurement, installation, and performance of brake monitors? Does brake monitoring add significantly to operator safety? Should brake monitors be optional?

(e) What recognition or status should be accorded to the Tentative ANSI B11.1 revision relating to alternative (redundant) safeguarding, such as presence sensing devices in combination with pullouts, when feeding with hands-out-of-dies is not feasible? Should the option of using redundant safeguarding satisfy § 1910.217(c)(5) in lieu of control reliability and brake monitoring? Should handtools for manual feeding continue to be acceptable as a form of hands-out-of-dies when meeting § 1910.217(c)(5) alternative safeguarding?

(f) Full revolution clutch presses account for about three quarters of operator injuries reported to OSHA. Should full revolution clutch presses operated with hands-in-dies feeding be required to have either redundant safeguards or limited choice of actuating means, for example, prohibition of foot treadle operation?

(g) Should the current prohibition of self-tripping using presence sensing devices effective December 31, 1976 continue to remain in effect?

(h) Should the ban on sweeps effective December 31, 1976 continue to remain in effect?

(i) Should foot pedal actuation be limited to fully guarded presses?

(j) Should a different safety distance formula based on the time for the closing portion of the press stroke be prescribed for part revolution clutch presses actuated by 2-hand trips?

(k) Can brake monitors checking on each application of the brake be as effective as those monitoring brake performance on every stroke?

8. *Section 1910.218 Forging machines.* (a) Which particular machines are considered forging machines that should be covered within § 1910.218?

(b) What hazards associated with saws, billet shears, conveyors, shot blast and other machines are unique only to forging operations?

(c) What hazards are associated with the use of lead in forge shops or die shops as opposed to the use of lead in any other type of operation?

(d) Should lockout be required for all forging machines? Lockout is currently required to forging presses (§ 1910.218(f)), for trimming presses (§ 1910.218(g)), for upsetters, (§ 1910.218(h)), for boltheading and rivet making (§ 1910.218(i)), and for billet shears (§ 1910.218(j)). What alternatives, if any, to lockout, would provide equivalent safety to employees?

(e) Data on machine injuries in the forging industry are solicited.

9. *Section 1910.219 Mechanical power-transmission apparatus.* (a) What particular machine elements or combinations thereof constitute power-transmission apparatus which should be covered by the requirements of § 1910.219 rather than the general machine guarding requirements of § 1910.212? Power-transmission apparatus can be an integral part of the machine. Belts and sheaves, chains and sprockets, and coupling and shafts are the most common types of power transmission apparatus. Other elements, such as cams, clutches, collars, and lead screws may be considered parts of the driven machine or a part of the power-transmission apparatus. How should the distinction as to applicability of the power transmission standard be made? Should machine elements be covered by the same requirements regardless of whether they are considered part of the power transmission apparatus or the driven machine?

(b) What present day design techniques and safeguarding methods should be incorporated into § 1910.219? The current standard is essentially the same as a 1924 standard published by the Bureau of Labor Standards. Most of the standard refers to the state-of-the-art of that era. What hazards are associated with newer power transmission apparatus? Injury data associated with equipment of particular design is solicited.

III. The Procedure

(a) *Written comments.* In order to facilitate the desired public comment on all relevant issues, this notice includes a three column presentation. One column contains the text of the existing standards; the second column sets forth the related ANSI provision where ANSI has modified the standard on which OSHA's existing standard was based; and the third column presents comments on the existing standard, requests for revision which OSHA has received and questions raised concerning the existing standard. The comments and recommendations contained in this document do not represent an OSHA position. It is hoped, however, that by setting them forth, OSHA will focus attention on some of the issues and questions relating to Subpart O and will encourage the submission of additional comments, alternatives, data (including injury data) and information from interested persons. Accordingly, interested persons are invited to submit written comments on the issues raised in this notice or on any other aspect of the standards comprising Subpart O. Written comments should be submitted on or before April 7, 1977, and should be sent to Docket O, Technical Data Center, Room N3620, U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210. Written submissions should clearly identify the portions of the standard addressed and the position taken. The data, views and information submitted will be available for public inspection and copying at the Technical Data Center, at the above address. Everyone interested in commenting—employers, employees, experts and others—are urged to submit in writing their comments, any applicable statistics or other data, and any other information.

(b) *Public meetings.* In addition to this request for written submissions, OSHA is scheduling public meetings at several locations. The purpose of these meetings is to afford the public the widest possible opportunity to submit their data and views on issues raised by this notice and on any other matters relevant to Subpart O. The dates and locations for these meetings and other important information for those desiring to attend, are stated in OSHA's notice on a new approach to Subpart O published in today's issue of the FEDERAL REGISTER at page 1742.

(c) *Further proceedings.* Following completion of the meetings and expiration of the comment period, OSHA will review all the information, arguments, views and data collected, as well as any other relevant data. If appropriate, OSHA will develop a proposal to amend the existing standards of Subpart O and will initiate rulemaking proceedings under section 6(b) of the Act. In the event that a proposal is issued, all the information gathered will become part of the public record in that proceeding.

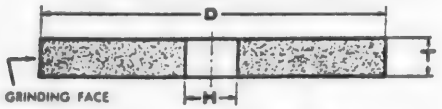
It should be noted, of course, that the existing standards continue in full force and effect, and will be enforced during this review process.

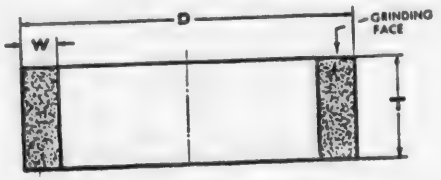
(Secs. 6 (84 Stat. 1593; 29 U.S.C. 655); Secretary of Labor's Order No. 8–76 (41 FR 25059))

Signed at Washington, D.C. this 27th day of December 1976.

MORTON CORN,
Assistant Secretary of Labor.

Present Standard	Latest ANSI Standard	Comments
1910.211 DEFINITIONS	01.1-1975	For simplicity each current section of §1910.211 would be relocated to that section of Subpart O to which it applies. Comments are requested. As is demonstrated by §1910.211(a)(1), §1910.211(d)(45) and §1910.211(f)(8) there are many definitions for "point of operation." Comments and suggested definitions of "point of operation" are requested. Would one definition be sufficient? Comments and suggestions are solicited on whether additional terms need to be added to the definitions, such as combs (featherboards).
(a) As used in §§1910.213 and 1910.214 unless the context clerly requires otherwise, the following woodworking machinery terms shall have the meaning prescribed in this paragraph.		
(1) "Point of operations" means that point at which cutting, shaping, boring, or forming is accomplished upon the stock.	Point of operation. The term "point of operation" shall be understood to mean that point at which cutting, shaping, boring, or forming is accomplished upon the stock.	
(2) "Push stick" means a narrow strip of wood or other soft material with a notch cut into one end and which is used to push short pieces of material through saws.	Push stick. The term "push stick" means a narrow strip wood or other soft material with a notch cut into one end and which is used to push short pieces of material through saws.	

Present Standard	Latest ANSI Standard	Comments
1910.211 (3) "Block" means a short block of wood, provided with a handle similar to that of a plane and a shoulder at the rear end, which is used for pushing short stock over revolving cutters. (b) As used in §1910.215 unless the context clearly requires otherwise, the following abrasive wheel machinery terms shall have the meanings prescribed in this paragraph. (1) "Type 1 straight wheels" means wheels having diameter, thickness, and hole size dimensions, and they should be used only on the periphery. Type 1 wheels shall be mounted between flanges. LIMITATION: Hole dimension (H) should not be greater than two-thirds of wheel diameter dimension (D) for precision, cylindrical, centerless, or surface grinding applications. Maximum hole size for all other applications should not exceed one-half wheel diameter. **Figure No. O-1** **TYPE 1 STRAIGHT WHEELS**  *Type 1 — Straight Wheel.* *Peripheral grinding wheel having a diameter, thickness and hole.*	01.1-1975 Push block. The term "push block" shall mean a short block of wood, provided with a handle similar to that of a plane and a shoulder at the rear end, which is used for pushing short stock over revolving cutters. (See A3 of the Appendix.)	(b) Comments and suggestions are requested as to the adequacy of the terms. (1) Tentative ANSI draft B7.1-1976 prepared by the Technical Committee for B7 (Tentative ANSI B7.1) proposes that this definition be changed to read: Type 1 straight wheels have diameter, thickness and hole size dimensions and should be used on the periphery. This does not preclude their use for applications such as shoulder and form grinding where it is recognized a limited amount of side grinding is performed. Extreme caution should be exercised not to use excessive side pressure. Type 1 wheels shall be mounted between flanges. Comments and suggestions are requested on whether these wheels could be used for side grinding.

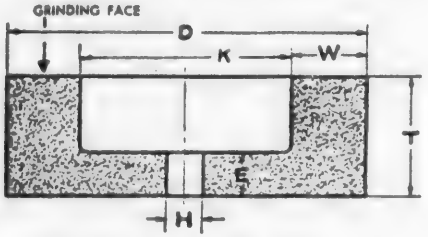
Present Standard	Latest ANSI Standard	Comments
1910.211 (2) "Type 2 cylinder wheels" means wheels having diameter, wheel thickness, and rim thickness dimensions. Grinding is performed on the rim face only, dimension W. Cylinder wheels may be plain, plate mounted, inserted nut, or of the projecting stud type. LIMITATION: Rim height, T dimension, is generally equal to or greater than rim thickness, W dimension. **Figure No. 0-2** **TYPE 2 CYLINDER WHEELS**  *Type 2 — Cylinder Wheel* *Side grinding wheel having a diameter, thickness and wall—wheel is mounted on the diameter.* (3) "Type 6 straight cup wheels" means wheels having diameter, thickness, hole size, rim thickness, and back thickness dimensions. Grinding is always performed on rim face, W dimension.	01.1-1975	

Present Standard	Latest ANSI Standard	Comments
1910.211	01.1-1975	

LIMITATION: Minimum back thickness, E dimension, should not be less than one-fourth T dimension. In addition, when unthreaded hole wheels are specified, the inside flat, K dimension, must be large enough to accommodate a suitable flange.

Figure No. 0-3

TYPE 6 STRAIGHT CUP WHEELS



Type 6 — Straight-cup Wheel
Side grinding wheel having a diameter, thickness and hole with one side straight or flat and the opposite side recessed. This type, however, differs from Type 5 in that the grinding is performed on the wall of the abrasive created by the difference between the diameter of the recess and the outside diameter of the wheel. Therefore, the wall dimension "W" takes precedence over the diameter of the recess as an essential intermediate dimension to describe this shape type.

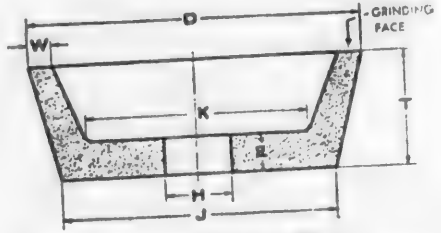
Present Standard	Latest ANSI Standard	Comments
1910.211	O1.1-1975	

(4) "Type 11 flaring cup wheels" mean wheels having double diameter dimensions D and J, and in addition have thickness, hole size, rim and back thickness dimensions. Grinding is always performed on rim face, W dimension. Type 11 wheels are subject to all limitations of use and mounting listed for type 6 straight cup wheels definition.

LIMITATION: Minimum back thickness, E dimension, should not be less than one-fourth T dimension. In addition, when unthreaded hole wheels are specified the inside flat, K dimension, shall be large enough to accommodate a suitable flange.

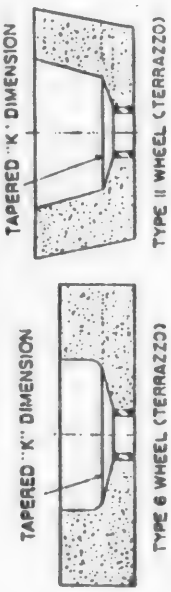
Figure No. 0-4

TYPE 11 FLARING CUP WHEELS



Type 11 — Flaring-cup Wheel
Side grinding wheel having a wall flared or tapered outward from the back. Wall thickness at the back is normally greater than at the grinding face (W).

Present Standard	Latest ANSI Standard	Comments
1910.211 (5) "Modified types 6 and 11 wheels (terrazzo)" mean some type 6 and 11 cup wheels used in the terrazzo trade having tapered K dimensions to match a special tapered flange furnished by the machine builder. LIMITATION: These wheels shall be mounted only with a special tapered flange.	01.1-1975	

Present Standard	Latest ANSI Standard	Comments
1910.211 Figure No. O-5 Type 6& 11 Wheels (Terrazzo)  Typical examples of modified types 6 and 11 wheels (terrazzo) showing tapered K dimensions.		

Present Standard	Latest ANSI Standard	Comments
1910.211	01.1-1975	
(6) Types 27 and 28 depressed center wheels" mean wheels having diameter, thickness, and hole size dimensions. Both types are reinforced organic bonded wheels having offset hubs which permit side and peripheral grinding operations without interference with the mounting. Type 27 wheels are manufactured with flat grinding rims permitting notching and cutting operations. Type 28 wheels have saucer shaped grinding rims.		(6) Tentative ANSI B7.1 proposes that this definition be changed to read: Type 27 and 28, depressed center wheels, have diameter, thickness and hole size dimensions. Both types are reinforced, organic bonded wheels having depressed center which permit grinding without interference with the mounting. Type 27 wheels are manufactured with flat grinding rims or faces and are designed for peripheral grinding, including small cutting-off and shallow notching operations. When grinding masonry and concrete surfaces such as ceilings and walls, they may be used flat. Such wheels have deeper than normal depressed centers for flat blending. Type 28 wheels have saucer-shaper grinding rims and are designed for corner grinding and side grinding, and shall not be used for cutting-off or notching operations. Comments are requested.

Present Standard	Latest ANSI Standard	Comments
1910.211 (i) Limitations: Special supporting, back adapter and inside flange nuts are required for the proper mounting of these types of wheels subject to limitations of §1910.215(c)(4)(i) and (ii). (ii) Mounts which are affixed to the wheel by the manufacturer may not require an inside nut and shall not be reused. (7) "Type 27A depressed center, cutting-off wheels" means wheel having diameter, thickness, and hole size dimensions. They are reinforced, organic bonded, offset hub type wheels, usually 16 inches diameter and larger, specially designed for use on cutting-off machines where mounting nut or outer flange interference cannot be tolerated. LIMITATIONS: See §1910.215(c)(1). (8) "Surface feet per minute" (s.f.p.m.) means the distance in feet any one abrasive grain on the peripheral surface of a grinding wheel travels in 1 minute. Surface Feet Per Minute= $\frac{3.1416 \times \text{diameter in inches} \times \text{r.p.m.}}{12}$ or .262 X diameter in inches X r.p.m.		

Present Standard	Latest ANSI Standard	Comments
1910.211 Examples: (a) 24-inch diameter wheel, 1,000 revolutions per minute. Surface feet per minute .262 X 1,000 = 6,288 s.f.p.m. (b) 12-inch diameter wheel, 1,000 revolutions per minute. Surface feet per minute .262 X 12 X 1,000 = 3,144 s.f.p.m. (9) "Flanges" means collars, discs or plates between which wheels are mounted and are referred to as adaptor, sleeve, or back up type. See paragraph (c) of §1910.215 for full description. (10) "Snagging" means grinding which removes relatively large amounts of material without regard to close tolerance or surface finish requirements. (11) "Off-hand grinding" means the grinding of any material or part which is held in the operator's hand. (12) "Safety guard" means an enclosure designed to restrain the pieces of the grinding wheel and furnish all possible protection in the event that the wheel is broken in operation. See paragraph (b) of §1910.215.		(b)(9) Tentative ANSI B7.1 proposes that "or back up type" be changed to "straight relieved or straight unrelieved types" for clarity.

Present Standard	Latest ANSI Standard	Comments
1910.211 (13) "Cutting off wheels" mean wheels having diameter thickness and hole size dimensions and are subject to all limitations of mounting and use listed for type 1 wheels, the definition in sub-paragraph (1) of this paragraph and paragraph (d) of §1910.215. They may be steel centered, diamond abrasive or organic bonded abrasive of the plain or reinforced type. (i) LIMITATION: Cutting off wheels are recommended only for use on specially designed and fully guarded machines and are subject to the following maximum thickness and hole size limitations. (ii) Maximum hole size for cutting-off wheels should not be larger than 1/4-wheel diameter.		

Present Standard	Latest ANSI Standard	Comments
1910.211 (14) "Abrasive wheel" means a cutting tool consisting of abrasive grains held together by organic or inorganic bonds. Diamond and reinforced wheels are included. (15) "Organic wheels" means wheels which are bonded by means of an organic material such as resin, rubber, shellac, or other similar bonding agent. (16) "Inorganic wheels" means wheels which are bonded by means of inorganic material such as clay, glass, procelain, sodium silicate, magnesium oxychloride, or metal. Wheels bonded with clay, glass, porcelain or related ceramic materials are characterized as "vitrified bonded wheels." (c) As used in §1910.216, unless the context clearly requires otherwise, the following mills and calendars in the rubber and plastic industries terms shall have the meanings prescribed in this paragraph. (1) "Bite" means the nip point between any two inrunning rolls. (2) "Calender" means a machine equipped with two or more metal rolls revolving in opposite directions and used for continuously sheeting		(c) The existing definitions related to §1910.216 have not generated significant comment.

Present Standard	Latest ANSI Standard	Comments
1910.211 or plying up rubber and plastics compounds and for frictioning or coating materials with rubber and plastics compounds. (3) "Mill" means a machine consisting of two adjacent metal rolls, set horizontally, which revolve in opposite direction (i.e., toward each other as viewed from above) used for the mechanical working of rubber and plastics compounds.		

Present Standard	Latest ANSI Standard	Comments
1910.211		The ANSI B11.1 standard committee draft dated January 21, 1974, revised definitions to make them clearer and more easily understood. All definitions changed by the Committee are indicated by underlined numerals in column 1. Comments are solicited on the need to change certain definitions to make them easier for persons to understand and to correct any other inadequacies or errors. Are additional definitions needed such as definitions of: operator, type A gate or mechanical power press? 2.30 Operator (Tentative B11.1 revision) The word operator means any individual performing production work on the mechanical power press machine. 2.8.2.1 Type A Gate or Movable Barrier Device (Tentative B11.1 revision) The words Type A gate or movable barrier device mean a movable barrier arranged to enclose the point of operation before the press stroke can be started, and which, once closed, is arranged to remain closed while the clutch is engaged or slide motion exists.
(d) As used in §1910.217, unless the context clearly requires otherwise, the following power press terms shall have the meaning prescribed in this paragraph.		

Present Standard	Latest ANSI Standard	Comments
1910.211 (1) "Antirepeat" means the part of the clutch/brake control system designed to limit the press to a single stroke if the tripping means is held operated. Antirepeat requires release of all tripping mechanisms before another stroke can be initiated. "Antirepeat" is also called single stroke reset or reset circuit. (2) "Brake" means the mechanism used on a mechanical power press to stop and/or hold the crankshaft, either directly or through a gear train, when the clutch is disengaged. (3) "Bolster plate" means the plate attached to the top of the bed of the press having drilled holes or T-slots for attaching the lower die or die shoe. (4) "Clutch" means the coupling mechanism used on a mechanical power press to couple the flywheel to the crankshaft, either directly or through a gear train. (5) "Full revolution clutch" means a type of clutch that, when tripped, cannot be disengaged until the crankshaft has completed a full revolution and the press slide a full stroke.		Comments and suggestions are solicited on the need to change the definitions for full revolution clutch and part revolution clutch to aid users in following the specific requirements which may differ depending on the type of clutch.

Present Standard	Latest ANSI Standard	Comments
1910.211		
		2.4.1 Full Revolution Clutch (Tentative B11.1 revision) The words full revolution clutch mean a type of clutch that, when tripped, cannot be disengaged until the drive mechanism (usually a crankshaft) has completed a full revolution and the slide a full stroke.
(6) "Part revolution clutch" means a type of clutch that can be disengaged at any point before the crankshaft has completed a full revolution and the press slide a full stroke.		2.4.2 Part Revolution Clutch (Tentative B11.1 revision) The words part revolution clutch mean a type of clutch that can be disengaged at any point before the drive mechanism (usually a crankshaft) has completed a full revolution and the slide a full stroke.
(7) "Direct drive" means the type of driving arrangement wherein no clutch is used; coupling and decoupling of the driving torque is accomplished by energization and deenergization of a motor. Even though not employing a clutch, direct drives match the operational characteristics of "part revolution clutches" because the driving power may be disengaged during the stroke of the press.		
(8) "Concurrent" means acting in conjunction, and is used to describe a situation wherein two or more controls exist in an operated condition at the same time.		(8) Comments and suggestions are invited on the need to improve the definition of "concurrent" to prevent confusion with "simultaneous" which is not defined. Two hand trips and controls are required to be operated concurrently not simultaneously.

Present Standard	Latest ANSI Standard	Comments
1910.211		E2.5 Concurrent (Tentative B11.1 revision explanation) Specifically, as applied to the operation of run buttons or inch controls, the use of the word concurrent means that the clutch will be activated after each hand of the operator is holding a control in the operated position. The use of the word concurrent is intended to exclude any inference that a simultaneous moment of actuation must exist between the operations of the individual two hand controls.
(9) "Continuous" means uninterrupted multiple strokes of the slide without intervening stops (or other clutch control action) at the end of individual strokes. (10) "Counterbalance" means the mechanism that is used to balance or support the weight of the connecting rods, slide, and slide attachments. (11) "Device" means a press control or attachment that: (i) Restrains the operator from inadvertently reaching into the point of operation, or (ii) Prevents normal press operation if the operator's hands are inadvertently within the point of operation, or		

Present Standard	Latest ANSI Standard	Comments
1910.211 (iii) Automatically withdraws the operator's hands if the operator's hands are inadvertently within the point of operation as the dies close. (12) "Presence sensing device" means a device designed, constructed and arranged to create a sensing field or area and to deactivate the clutch control of the press when an operator's hand or any other parts of his body is within such field or area. (13) "Gate or movable barrier device" means a movable barrier arranged to enclose the point of operation before the press stroke can be started. (14) "Holdout or restraint device" means a mechanism, including attachments for operator's hands, that when anchored and adjusted prevent the operator's hands from entering the point of operation. (15) "Pull-out device" means a mechanism attached to the operator's hands and connected to the upper die or slide of the press, that is designed, when properly adjusted, to withdraw the operator's hands as the dies close, if the operator's hands are inadvertently within the point of operation.		(13) Gate or movable barrier devices are now classified as Type A and Type B. Should the different classifications be the subject of new definitions in addition to the description given in paragraph (c)? (15) The current definition of pull-out has resulted in the granting of two variances for pull-outs not connected to the upper die or slide. Comments are solicited on the need to change the definition to allow pull-outs connected to other parts of the press or operated by a separately powered linkage. Should a new term be used to identify safeguards used to remove operators hands when they are powered by other than the slide or the die?

Present Standard	Latest ANSI Standard	Comments
1910.211 (16) "Sweep device" means a single or double arm (rod) attached to the upper die or slide of the press and designed to move the operator's hands to a safe position as the dies close, if the operator's hands are inadvertently within the point of operation. (17) "Two hand control device" means a two hand trip that further requires concurrent pressure from both hands of the operator during a substantial part of the die-closing portion of the stroke of the press. (18) "Die" means the tooling used in a press for cutting or forming material. An upper and a lower die make a complete set. (19) "Die builder" means any person who builds dies for power presses. (20) "Die set" means a tool holder held in alignment by guide posts and bushings and consisting of a lower shoe, an upper shoe or punch holder, and guide posts and bushings.		2.9 Die The word die means the complete (or a portion of) tooling component used for cutting, forming or assembling material within its point of operation. This tooling component is used with the press and other components to comprise a complete machine.

Present Standard	Latest ANSI Standard	Comments
1910.211 (21) "Die setter" means an individual who places or removes dies in or from mechanical power presses, and who, as a part of his duties, makes the necessary adjustments to cause the tooling to function properly and safely. (22) "Die setting" means the process of placing or removing dies in or from mechanical power press, and the process of adjusting the dies, other tooling and safeguarding means to cause them to function properly and safely. (23) "Die shoe" means a plate or block upon which a die holder is mounted. A die shoe functions primarily as a base for the complete die assembly, and, when used, is bolted or clamped to the bolster plate or the face of slide. (24) "Ejector" means a mechanism for removing work or material from between the dies. (25) "Face of slide" means the bottom surface of the slide to which the punch or upper die is generally attached. (26) "Feeding" means the process of placing or removing material within or from the point of operation.		

Present Standard	Latest ANSI Standard	Comments
1910.211 (27) "Automatic feeding" means feeding wherein the material or part being processed is placed within or removed from the point of operation by a method or means not requiring action by an operator on each stroke of the press. (28) "Semiautomatic feeding" means feeding wherein the material or part being processed is placed within or removed from point of operation by an auxiliary means controlled by operator on each stroke of the press. (29) "Manual feeding" means feeding wherein the material or part being processed is handled by the operator on each stroke of the press. (30) "Foot control" means the foot operated control mechanism designed to be used with a clutch or clutch/brake control system. (31) "Foot pedal" means the foot operated lever designed to operate the mechanical linkage that trips a full revolution clutch. (32) "Guard" means a barrier that prevents entry of the operator's hands or fingers into the point of operation.		

Present Standard	Latest ANSI Standard	Comments
1910.211 (33) "Die enclosure guard" means an enclosure attached to the die shoe or stripper, or both, in a fixed position. (34) "Fixed barrier guard" means a die space barrier attached to the press frame. (35) "Interlocked press barrier guard" means a barrier attached to the press frame and interlocked so that the press stroke cannot be started normally unless the guard itself, or its hinged or movable sections, enclose the point of operation. (36) "Adjustable barrier guard" means a barrier requiring adjustment for each job or die setup. (37) "Guide post" means the pin attached to the upper or lower die shoe, operating within the bushing on the opposing die shoe, to maintain the alignment of the upper and lower dies. (38) "Hand feeding tool" means any hand held tool designed for placing or removing material or parts to be processed within or from the point of operation.		2.21.2 Fixed Barrier Guard (Tentative B11.1 revision) The words fixed barrier guard mean a die space barrier attached to the press component frame or bolster plate.

Present Standard	Latest ANSI Standard	Comments
1910.211		
(39) "Inch" means an intermittent motion imparted to the slide (on machines using part revolution clutches) by momentary operation of the "Inch" operating means. Operation of the "Inch" operating means engages the driving clutch so that a small portion of one stroke or indefinite stroking can occur, depending upon the length of time the "Inch" operating means is held operated. "Inch" is a function used by the die setter for setup of dies and tooling, but is not intended for use during production operations by the operator.		(39) The definition of "inch" describes its use in die setting and infers prohibition of use by operators starting a new coil on automatic feed operations. Comment is sought on the need to change the definition to recognize use for starting a coil or other than die setter use.
(40) "Jog" means an intermittent motion imparted to the slide by momentary operation of the device motor, after the clutch is engaged with the flywheel at rest.		
(41) "Knockout" means a mechanism for releasing material from either die.		
(42) "Liftout" means the mechanism also known as knockout.		
(43) "Operator's station" means the complete complement of controls used by or available to an operator on a given operation for stroking the press.		(43) Comments are invited on the possible need to define the term "operator" for purposes of §1910.217. 2.30 Operator The word operator means any individual performing production work on the mechanical power press machine.

Present Standard	Latest ANSI Standard	Comments
1910.211		
(44) "Pinch point" means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a press or auxiliary equipment, or between moving and stationary parts of a press or auxiliary equipment or between the material and moving part or parts of the press of auxiliary equipment.		
(45) "Point of operation" means the area of the press where material is actually positioned and work is being performed during any process such as shearing, punching, forming, or assembling.		(45) Comments are solicited on the need to change the definition of point of operation to clarify the meaning which is critical when measuring safety distance. The point of operation is relative to the tooling (die) rather than the press bolster or slide. 2.35 Point of Operation (Tentative B11.1 revision) The words point of operation means the area of the die (tooling component) where material is actually positioned and work is being performed during any process such as cutting, forming or assembling.
(46) "Press" means a mechanically powered machine that shears, punches, forms, or assembles metal or other material by means of cutting, shaping, or combination dies attached to slides. A press consists of a stationary bed or anvil, and a slide (or slides)		(46) Comments and suggestions are invited on the need to further define press to mean mechanical power press and not press brakes, shears, ironworkers, etc. 2.36 Press or Mechanical Power Press (Tentative B11.1 revision)

Present Standard	Latest ANSI Standard	Comments
1910.211 having a controlled reciprocating motion toward and away from the bed surface, the slide being guided in a definite path by the frame of the press. (47) "Repeat" means an unintended or unexpected successive stroke of the press resulting from a malfunction. (48) "Safety block" means a prop that, when inserted between the upper and lower dies or between the bolster plate and the face of the slide, prevents the slide from falling of its own deadweight. (49) "Single stroke" means one complete stroke of the slide, usually initiated from a full open (or up) position, followed by closing (or down), and then a return to the full open position.		2.36.1 Press Component, or Mechanical Power Press Component The words mechanical power press component mean the basic press (component) of the mechanical power press machine; that portion devoid of the tooling component, the safeguarding component(s) and auxiliary feeding components. 2.36.2 Press Machine or Mechanical Power Press Machine The words mechanical power press machine mean the combination of the press component, tooling component, safeguarding component(s) and feeding components; thus a complete machine existing in a state capable of processing the specific job requirement for which it is outfitted by the user.

Present Standard	Latest ANSI Standard	Comments
1910.211 (50) "Single stroke mechanism" means an arrangement used on a full revolution clutch to limit the travel of the slide to one complete stroke at each engagement of the clutch. (51) "Slide" means the main reciprocating press member. A slide is also called a ram, plunger, or platen. (52) "Stop control" means an operator control designed to immediately de-activate the clutch control and activate the brake to stop slide motion. (53) "Stripper" means a mechanism or die part for removing the parts or material from the punch. (54) "Stroking selector" means the part of the clutch/brake control that determines the type of stroking when the operating means is actuated. The stroking selector generally includes positions for "Off" (Clutch Control), "Inch," "Single Stroke," and "Continuous" (when Continuous is furnished). (55) "Trip or (tripping)" means activation of the clutch to "run" the press.		2.46 Single Stroke Mechanism (Tentative B11.1 revision) The words single stroke mechanism mean a mechanical arrangement within the clutch assembly designed to provide single stroke capability.

Present Standard	Latest ANSI Standard	Comments
1910.211 (56) "Turnover bar" means a bar used in die setting to manually turn the crankshaft of the press. (57) "Two-hand trip" means a clutch actuating means requiring the concurrent use of both hands of the operator to trip the press. (58) "Unitized tooling" means a type of die in which the upper and lower members are incorporated into a selfcontained unit so arranged as to hold the die members in alignment. (59) "Control system" means sensors, manual input and mode selection elements, interlocking and decision-making circuity, and output elements to the press operating mechanism. (60) "Brake monitor" means a sensor designed, constructed, and arranged to monitor the effectiveness of the press braking system.		

Present Standard	Latest ANSI Standard	Comments
1910.211	B24.1-1971 (R-1975)	
(e) As used in §1910.218, unless, the context clearly requires otherwise, the following forging and hot metal terms shall have the meaning prescribed in this paragraph.		(e) Comments and suggestions are requested as to whether additional terms should be included in the definitions.
(1) "Forging" means the product of work on metal formed to a desired shape by impact or pressure in hammers, forging machines (upsetters), presses, rolls, and related forming equipment. Forging hammers, counter-blow equipment and high-energy-rate forging machines impart impact to the workpiece, while most other types of forging equipment impart squeeze pressure in shaping the stock. Some metals can be forged at room temperature, but the majority of metals are made more plastic for forging by heating.		
(2) "Open frame hammers (or blacksmith hammers)" means hammers used primarily for the shaping of forgings by means of impact with flat dies. Open frame hammers generally are so constructed that the anvil assembly is separate from the operating mechanism and machine supports; it rests on its own independent foundation. Certain exceptions are forging hammers made	2.3.1 Open Frame Hammers (or Blacksmith Hammers) Open frame hammers are used primarily for the shaping for forgings by means of impact with flat dies. Open frame hammers generally are so constructed that the anvil assembly is separate from the operating mechanism and and machine supports; it rests on its own independent foundation. Certain exceptions	

Present Standard	Latest ANSI Standard	Comments
1910.211	B24.1-1971 (R-1975)	
with frame mounted on the anvil; e.g., the smaller, single-frame hammers are usually made with the anvil and frame in one piece.	are forging hammers made with frame mounted on the anvil; for example, the smaller, single-frame hammers are usually made with the anvil and frame in one piece.	
(3) "Steam hammers" means a type of drop hammer where the ram is raised for each stroke by a double-action steam cylinder and the energy delivered to the workpiece is supplied by the velocity and weight of the ram and attached upper die driven downward by steam pressure. Energy delivered during each stroke may be varied.	2.3.2 Steam hammers A type of drop hammer where the ram is raised for each stroke by a double-action steam cylinder and the energy delivered to the workpiece is supplied by the velocity and weight of the ram and attached upper die driven downward by steam pressure. Energy delivered during each stroke may be varied.	
(4) "Gravity hammers" means a class of forging hammer wherein energy for forging is obtained by the mass and velocity of a freely falling ram and the attached upper die. Examples: board hammers and air-lift hammers.	2.4 Gravity hammers A class of forging hammer wherein energy for forging is obtained by the mass and velocity of a freely falling ram and the attached upper die. Examples: board hammers and air-lift hammers.	
(5) "Forging presses" mean a class of forging equipment wherein the shaping of metal between dies is performed by mechanical or hydraulic pressure, and usually is accomplished with a single workstroke of the press for each die station.	2.5 Forging Presses A class of forging equipment wherein the shaping of metal between dies is performed by mechanical or hydraulic pressure, and usually is accomplished with a single work-stroke of the press for each die station.	
(6) "Trimming Presses" mean a class of auxiliary forging equipment which removes flash or excess metal from a forging. This trimming operation can	2.6 Trimming Presses A class of auxiliary forging equipment which removes flash or excess metal from a forging.	

Present Standard	Latest ANSI Standard	Comments
1910.211	B24.1-1971 (R-1975)	
also be done cold, as can coining, a product sizing operation.	This trimming operation can also be done cold, as can coining, a product sizing operation.	
(7) "High-energy-rate" forging machines" mean a class of forging equipment wherein high ram velocities resulting from the sudden release of a compressed gas against a free piston impart impact to the workpiece.	2.8 High-Energy-Rate Forging Machines A class of forging equipment wherein high ram velocities resulting from the sudden release of a compressed gas against a free piston impart impact to the workpiece.	
(8) "Forging rolls" mean a class of auxiliary forging equipment wherein stock is shaped between power driven rolls bearing contoured dies. Usually used for preforming, roll forging is often employed to reduce thickness and increase length of stock.	2.9.1 Forging Rolls A class of auxiliary forging equipment wherein stock is shaped between power driven rolls bearing contoured dies. Usually used for preforming, roll forging is often employed to reduce thickness and increase length of stock.	
(9) "Ring rolls" means a class for forging equipment used for shaping weldless rings from pierced discs or thick-walled, ring-shaped blanks between rolls which control wall thickness, ring diameter, height and contour.	2.9.2 Ring Rolls A class for forging equipment used for shaping weldless rings from pierced discs or thick-walled, ring-shaped blanks between rolls which control wall thickness, ring diameter, height, and contour.	
(10) "Bolt-headers" mean the same as an upsetter or forging machine except that the diameter of stock fed into the machine is much smaller, i.e., commonly three-fourths inch or less.	2.9.3 Bolt-Headers Same as an upsetter or forging machines except that the diameter of stock fed into the machine is much smaller, that is, commonly 3/4 inch or less.	

Present Standard	Latest ANSI Standard	Comments
1910.211 (11) Rivet making machines mean the same as upsetters and boltheaders when producing rivets with stock diameter of 1-inch or more. Rivet making with less than 1-inch diameter is usually a cold forging operation, and therefore not included in this subpart. (12) Upsetters (or forging machines, or headers) type of forging equipment, related to the mechanical press, in which the main forming energy is applied horizontally to the workpieces which is gripped and held by prior action of the dies.	B24.1-1971 (R-1975) 2.9.4 Rivet-Making Machines Same as upsetters and bolt-headers when producing rivets with stock diameter of 1 inch or more. Rivet making with less than 1-inch diameter is usually a cold forging operation, and therefore not included in this standard. 2.7 Upsetters (or Forging Machines, or Headers) A type of forging equipment, related to the mechanical press, in which the main forming energy is applied horizontally to the workpiece which is gripped and held by prior action of the dies.	

Present Standard	Latest ANSI Standard	Comments
1910.211	B15.1-1972	
(f) As used in §1910.219, unless, the context clearly requires otherwise, the following mechanical power-transmission guarding terms shall have the meaning prescribed in this paragraph.		(f) Comments and suggestions are requested as to whether additional terms need to be included in the definitions such as gears.
(1) "Belts" include all power transmission belts, such as flat belts, round belts, V-belts, etc., unless otherwise specified.	6. Definitions Belts. The term "belts" is to include all power transmission belts, such as flat belts, round belts, V-belts, etc., unless otherwise specified.	
(2) "Belt shifter" means a device for mechanically shifting belts from tight to loose pulleys or vice versa, or for shifting belts on cones of speed pulleys.		(f)(2),(3) ANSI discontinues the use of these terms because line shafting was not a part of the 1972 edition. Are these terms applicable to present day usage?
(3) "Belt pole" (sometimes called a "belt shipper" or "shipper pole") means a device used in shifting belts on and off fixed pulleys on line or countershaft where there are no loose pulleys.		
(4) "Exposed to contact" means that the location of an object is such that a person is likely to come into contact with it and be injured.	Exposed to Contact. The term "exposed to contact" shall be interpreted as meaning that a person is likely to come into contact with it and be injured.	
(5) "Flywheels" include flywheels, balance wheels, and flywheel pulleys mounted and revolving on crankshaft of engine or other shafting.	Flywheels. The term "flywheel" is to include flywheels, balance wheels, and flywheel pulleys mounted and revolving on crank shaft of engine or other shafting.	

Present Standard	Latest ANSI Standard	Comments
1910.211	B15.1-1972	
(6) "Maintenance runway" means any permanent runway or platform used for oiling, maintenance, running adjustment, or repair work, but not for passageway.	Maintenance Runway. "Runway" shall mean any permanent runway or platform used for oiling, maintenance, adjustment, or repair work, but not for passageway.	(f)(6) These runways obviously are used as a passageway. Should it be clarified to mean normal passage as contrasted to passage for the uses listed?
(7) "Nip-point belt and pulley guard" means a device which encloses the pulley and is provided with rounded or rolled edge slots through which the belt passes.		(f)(7) If belts are guarded with the pulley, is this terminology appropriate to §1910.219?
(8) "Point of operation" means that point at which cutting, shaping, or forming is accomplished upon the stock and shall include such other points as may offer a hazard to the operator in inserting or manipulating the stock in the operation of the machine.	Point of Operation. The term "point of operation" shall be understood to mean that point at which cutting, moving, forming, or other functional change is accomplished upon the processed material.	(f)(8) Many different opinions exist as to proper definition of a point of operation. What is the common and accepted definition?
(9) "Prime movers" include steam, gas, oil and air engines, motors, steam and hydraulic turbines, and other equipment used as a source of power.	Prime Mover. The term "prime movers" as used in this standard is to include equipment used as the primary source of power, such as engines, motors and turbines.	
(10) "Sheaves" mean grooved pulleys, and shall be so classified unless used as flywheels.	Sheaves. "Sheaves" shall be considered as grooved pulleys, and shall be so classified unless used as flywheels.	
	Gears. A set or train of gears comprises two or more intermeshing gears.	Comments are solicited as to whether the remaining ANSI definitions beginning with "Gears" are accurate and should they become a a part of §1910.219?
	Guarded. "Guarded" means shielded, fenced, enclosed or otherwise protected by means of enclosures, covers, shield guards, trough guards, railing guards, or by nature of location or position so as to remove foreseeable risk of personal injury from accidental contact or approach or failure of component.	

Present Standard	Latest ANSI Standard	Comments
1910.211	B15.1-1972 Securely Fastened. The term "securely fastened" shall mean that the safety device or object referred to shall be so secured in place that it cannot be moved under normal or reasonably foreseeable conditions or circumstances. Shall. The word "shall" is to be understood as mandatory. Shear Point. The immediate area where two or more machine elements pass in close contact, creating a shearing action, is defined as "shear point." The elements may be in any form of motion, or one may be at rest. (See Appendix Paragraphs A2.2.2 and A2.2.3.) Should, The word "should" is to be understood as advisory. Sprockets. A set of sprockets comprises two or more sprockets carrying one or more chains.	

Present Standard	Latest ANSI Standard	Comments
1910.212 GENERAL REQUIREMENTS FOR ALL MACHINES	ANSI has no equivalent standard, performance language oriented or otherwise, intended to cover and apply to all machinery. Therefore, none of the paragraphs presented in this document show comparison data.	
Scope - No equivalent		Scope - It has been suggested that §1910.212 be modified to include a scope. Would expanding the section to incorporate a scope help to clarify the intent? Should the scope identify machine hazards? What other areas should the scope cover? Should we exclude coverage for portable powered tools? It has been suggested that a paragraph headed "General Requirements for All Machines" be included. Additional criteria would be established for the following: 1. Design and construction of new equipment 2. Modification of existing equipment 3. Operator machine controls 4. Machine maintenance and inspection 5. Operator training.
Definitions - See §1910.211		Definitions - The current regulation does not identify the definitions in §1910.211 which address §1910.212. Those definitions appropriate for §1910.212 would be included.
(a) Machine guarding. (1) Types of guarding. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards		(a)(1) Comments are solicited on the desirability of clarifying the fact that guards and devices are separate categories of safeguarding.

Present Standard	Latest ANSI Standard	Comments
1910.212 such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are--barrier guards, two-hand tripping devices, electronic safety devices, etc.		Should this section also identify those hazards relating to inherently hazardous materials? Ex: Sharp or pointed machine parts or work pieces, extremely hot or cold machine parts or work pieces. Should the hazards of a machine at rest be addressed by lockout and tagging rules? Should the examples of machine guarding be clarified, expanded and defined in accordance with current technology? Should performance criteria be established for each safeguarding method? Comments and information are solicited for, but not limited to defining the terms and the relation of hazards to the use of safeguarding methods such as: 1. Shields 2. Interlocks 3. Guarding by location--machines and operators 4. Automatic devices (pull or push out) 5. Automatic or semi-automatic feed, stripping, or removal 6. Lockout 7. Barrier guards 8. Two-hand trip devices Do we need to differentiate between two-hand trip controls and two-hand controls? Should secondary safeguarding methods be identified as such and defined? Comments and information are solicited for the use of secondary safeguarding methods such as:

Present Standard	Latest ANSI Standard	Comments
1910.212		1. Awareness barrier or device 2. Special hand feed tools or devices 3. The use of safety blocks 4. Tag-out of equipment.
(2) General requirements for machine guards. Guards shall be affixed to the machine where possible and secured elsewhere if for any reasons attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself.		(a)(2) Comments are solicited on the suggestion that OSHA incorporate the point of operation guard performance language as specified in §1910.217 paragraphs (c)(1)(i) and (ii) and (c)(2)(i)(a)-(f) and as specified for point of operation devices in paragraph (c)(3)(i)(a)-(g).
(3) Point of operation guarding. (i) Point of operation is the area on a machine where work is actually performed upon the material being processed. (ii) The point of operation of machines whose operation exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with any appropriate standards therefore, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.		(a)(3)(ii) ANSI has petitioned OSHA to reference their machinery standards as guidelines to §1910.212 because §1910.212 does not specify how machines should be guarded. Should a list of industry consensus standards applicable to specific machines be developed and provided as a technical guide utilizing the work of ANSI or other organizations? Should Table O-10 in §1910.217, which sets forth the maximum permissible guard or barrier openings for mechanical power presses be applied to all machines? Should any exceptions be made?

Present Standard	Latest ANSI Standard	Comments
1910.212 (iii) Special handtools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required by this section, but can only be used to supplement protection provided. (iv) The following are some of the machines which usually require point of operation guarding: (a) Guillotine cutters (b) Shears (c) Alligator shears (d) Power presses (e) Milling machines (f) Power saws (g) Jointers (h) Portable power tools (i) Forming rolls and calenders. (4) Barrels, containers, and drums. Revolving drums, barrels, and containers shall be guarded by an enclosure which is interlocked with the drive mechanism, so that the barrel, drum, or container cannot revolve unless the guard enclosure is in place.		(a)(3)(iii) Comments and suggestions are solicited on whether the use of special hand tools should be required where safeguarding is not feasible and hand tools are the only means of operator protection. Examples of such instances are requested. (a)(3)(iv) Comments are solicited on the content of this list of machines requiring point of operation guarding. Is there any reason to include portable powered tools since these are covered in Subpart P? Should the list be expanded to indicate the type of guarding used for each machine? If the applicable consensus standards are listed in (a)(3)(ii), which other machines should be listed in (a)(3)(iv)? (a)(4) Comments and information are solicited on the need to clarify this rule. What criteria can be applied to preclude application to a centrifuge or chemical (in drums) mixer?

Present Standard	Latest ANSI Standard	Comments
1910.212 (5) Exposure of blades. When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one half (1/2) inch.		(a)(5) Comments have been received indicating confusion with the scope and interpretation for exposure of blades. It has also been noted that the 1/2 inch dimension is unnecessarily restrictive. Program directives have been issued to differentiate between employee comfort cooling fans and process cooling fans in applying this standard and to allow the use of concentric rings and mesh guarding methods. Should (a)(5) limit application of the standard to direct ventilation and cooling of employees? Should the 1/2 inch dimension limiting the size of opening be replaced with tabled information relating the size of opening to the distance from the blade to provide more flexibility for application and employee protection? Examples of fans which should not be subject to this rule such as, transformer cooling fans, boiler forced draft fans, electric motor cooling fans, process air movers, are solicited. Should process fans be the subject of a separate standard? What injury data is available to justify a rule? Note: The Consumers Product Safety Commission has denied a petition for a fan guarding specification on the grounds that a problem does not exist.

Present Standard	Latest ANSI Standard	Comments
1910.212 (b) Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.		(b) Anchoring Fixed Machinery. Is the wording to describe the anchoring of fixed machinery too restrictive and does it inhibit current technology? Should "securely anchored" be replaced with "restrained to prevent movement" in order to take advantage of a machine's friction for utilizing such devices as, vibration isolation pads and mountings or suction cups to prevent movement? Should anchoring of machines be based on the hazards of being struck by material handling equipment or overhead cranes and hoist supporting work pieces? Design and Construction of New Equipment. Should the criteria for the design and construction of new equipment be specifically stated or should we refer to acceptable industry standards? Modification of Existing Equipment. What requirements as to modification of existing equipment should be specified? Operator Machine Controls. Can the hazards requiring specific types of operator machine controls be identified for all machines? Comments and information are solicited to identify the hazards and operating conditions which require controls to suit the following criteria:

Present Standard	Latest ANSI Standard	Comments
1910.212		1. Identification as to function and accessible location 2. Operating mode selection control and supervision 3. Protection from unintended operation 4. Emergency stop control criteria. Ex: For systems other than start/stop; when more than one operator or the point of operation hazard is involved; for manually feeding, removing or manipulating; for a machine operated by remote control or for a machine capable of operating in the continuous mode. What other conditions should be considered? Machine Inspection and Maintenance. Would machine inspection and maintenance criteria written in performance language and intended to cover all machines contribute significantly to reducing employee exposure to hazards? What criteria could be adopted? Operator Training. How can a requirement for employee training in hazard recognition and the safe care and operation of equipment be written to give uniform guidelines to employers and maximum protection to employees?

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	The appropriate definitions for this section found in §1910.211(a) would be included in §1910.213.
	1. General	
	1.1 Scope. Specifications for the safe installation, operation, and maintenance of woodworking machinery and accessory equipment, including cooperage and veneering operations, but excluding the manufacture of structural plywood.	1.1 Although the machinery unique to the structural plywood industry is included under general requirements for machine safeguarding the current OSHA standards do not specifically refer to this type of machinery. Comments and information are solicited on methods of safeguarding the operation of such machinery. It should be noted that the new ANSI standard specifically excludes the manufacture of structural plywood. Petitioners have suggested that the sawmill industry be specifically excluded from the woodworking standard provisions. Should cooperage be included in the scope as defined by ANSI or should it maintain the separate identity it now has in §1910.214? Is 1910.213 being used to address hazards not covered in 1910.265?
(a) Machine construction general. (1) Each machine shall be so constructed as to be free from sensible vibration when the largest size tool is mounted and run idle at full speed.	5. Machines and Equipment 5.1.1.2 Each machine shall be designed, constructed, and mounted in a manner that will eliminate hazardous vibration at any operating speed while using any tool designed for the machine.	(a)(1) Comments are solicited on methods to determine when a machine's vibration is indicative of a hazard.

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
(2) Arbors and mandrels shall be constructed so as to have firm and secure bearing and be free from play.	5.1.1.3 Arbors and mandrels shall be constructed so as to have firm and secure bearing and shall be free from excessive end-play that would cause a condition hazardous to workers.	(a)(2) Comments are solicited to identify those conditions created by arbor and mandrel end-play which expose employees to hazards.
(3) The use of wooden bandsaw wheels other than those of commercial manufacture is prohibited.	5.1.1.4 Band saw wheels shall be designed and manufactured so that they will be capable of withstanding the strains imposed. Band wheels 7 inches or more in width shall have a minimum rim thickness of 5/8 inch if made of cast iron or 1/2 inch if of cast steel, except for a distance not to exceed 1 inch from either edge.	
(4) Any automatic cutoff saw that strokes continuously without the operator being able to control each stroke shall not be used.	5.1.1.5 Where employees are exposed to their hazards, automatic cutoff saws that stroke continuosuly, without the operator being able to control each stroke, shall not be used.	(a)(4) Comments and information are solicited to define those conditions under which employees are exposed to the hazards of continuously stroking, automatic cutoff saws when the operator does not have the ability to control each stroke.
(5) Saw frames or tables shall be constructed with lugs cast on the frame or with an equivalent means to limit the size of the saw blade that can be mounted, so as to avoid overspeed caused by mounting a saw larger than intended.	5.1.1.6 Saw frames shall be provided with permanent means to limit the size of the saw that can be mounted.	(a)(5) Comments and information are solicited to determine if a physical means to prevent the use of an oversize saw blade in a machine will control the hazards. What are the hazards? Is a hazard created with the use of too small a diameter saw blade?
(6) Circular saw fences shall be so constructed that they can be firmly secured to the table or table assembly without changing their alignment with the saw. For saws with tilting tables or	5.1.1.7 Fences, material guides, and spreaders shall be designed and constructed in a manner that allows them to be properly secured to the table or table assembly and to remain in alignment with	

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tilting arbors the fence shall be so constructed that it will remain in a line parallel with the saw, regardless of the angle of the saw with the table.	the cutting blade. Fences, material guides, and spreaders on cutting machines with tilting tables or tilting arbors shall also remain in alignment with the cutting blade in any position.	
(7) Circular saw gages shall be so constructed as to slide in grooves or tracks that are accurately machined, to insure exact alignment with the saw for all positions of the guide.	5.1.1.8 Grooves or tracks for sliding material guides shall be accurately machined parallel to ensure alignment with the blade for all positions of the guide.	
(8) Hinged saw tables shall be so constructed that the table can be firmly secured in any position and in true alignment with the saw.	5.1.1.9 Hinged or tilting tables shall be so constructed that the table can be firmly secured in the desired position and in alignment with the cutting tool.	
(9) All belts, pulleys, gears, shafts, and moving parts shall be guarded in accordance with the specific requirements of §1910.219.	5.1.2.1 Whenever possible, driving power for woodworking machinery shall be provided by individual motor or motors mounted on the machine, or on a separate base adjacent to the machine. All belts, pulleys, gears, shafts, and other moving parts shall be guarded in accordance with the specific requirements of American National Standard Safety Standard for Mechanical Power Transmission Apparatus, B15.1-1972.	
(10) It is recommended that each power-driven woodworking machine can be provided with a disconnect switch that can be locked in the off position.	5.1.2.3 Each power-driven woodworking machine shall be provided with a positive disconnect from the source of power, which can be secured in the "off" position.	(a)(10) Comments are solicited on whether mandatory lock-out should be required for all power driven woodworing machines.

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(11) The frames and all exposed, noncurrent-carrying metal parts of portable electric woodworking machinery operated at more than 90 volts to ground shall be grounded and other portable motors driving electric tools which are held in the hand while being operated shall be grounded if they operate at more than 90 volts to ground. The ground shall be provided through use of a separate ground wire and polarized plug and receptacle.	5.1.2.2 Electrically driven woodworking machinery shall be grounded in accordance with American National Standard National Electrical Code, C1-1971 (NFPA No. 70-1971). Note C-1-1971 has been superceded by C-1-1975.	(a)(11) Comments are solicited on the suggestions received by OSHA to revise (a)(11) as follows: 1. (a)(11) should cover non-portable woodworking machinery with reference to Part 1910, Subpart S (National Electric Code) to maintain consistency for the electrical grounding of all machines. 2. The requirements for portable electric woodworking machines should be moved to §1910.243, Subpart P which deals with portable power tools.
No equivalent	No equivalent	(a) A petition has been received requesting OSHA to draft mandatory requirements in paragraph (a) for a braking requirement to provide for the elimination of the hazards presented by a coasting saw blade. Comments and information are requested to specifically identify the hazards of a coasting saw blade, define the conditions under which they are present and to roughly approximate the design or performance criteria necessary to control exposure to the hazards.
No equivalent	5.2 Machine Guarding. It is recognized that the standards for guarding are not universally applicable to all operations. The standards given are those that are generally accepted in the industry. Since there are a number of situations not satisfactorily covered by these standards, the enforcing authority should exercise latitude in allowing the use of other devices.	5.2 A petitioner has requested that the provision of ANSI 01.1-1975 (5.2) be included in the OSHA regulations to allow other guarding devices providing equal protection and to encourage the development of new devices. Information and data are requested as to those situations which are not adequately covered by the present machine guarding standard. What other guarding devices would provide adequate employee protection?

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(12) For all circular saws where conditions are such that there is a possibility of contact with the portion of the saw either beneath or behind the table, that portion of the saw shall be covered with an exhaust hood, or, if no exhaust system is required with a guard that shall be so arranged as to prevent accidental contact with the saw.	6.1 Circular, Crosscut, and Swing Cutoff Saws, Ripsaws; and Resaws 6.1.1 Guarding of Saws Beneath and Behind Tables. Guarding beneath the table level should be provided so as to enclose the saw blade from unintended contact and to prevent contact with moving parts of the drive mechanism. The saw frame, motor (including a separately shipped motor), exhaust hood, or additional enclosures beneath the table may be considered as part of this guarding. If an open-bottom enclosure is used to guard the blade or other moving parts from contact, the depth of the enclosure shall be such that the plane of the bottom is 1 inch or more below the bottom of the saw blade with the blade in its lowest position.	(a)(12) Comments are solicited as to whether the generic term "circular saws" is sufficient to identify the variations of crosscut, swing cutoff, ripsaws and resaws.
(13) Revolving double arbor saws shall be fully guarded in accordance with all the requirements for circular crosscut saws or with all the requirements for circular rip-saws, according to the kind of saws mounted on the arbors.	6.1.4 Revolving Multiple Arbor Saws. Revolving multiple arbor saws shall be fully guarded in accordance with all the requirements of this section.	
(14) No saw, cutter head, or tool collar shall be placed or mounted on a machine arbor unless the tool has been accurately machined to size and shape to fit the arbor.	No equivalent	

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(15) Combs (featherboards) or suitable jigs shall be provided at the workplace for use when a standard guard cannot be used, as in dadoing, grooving, jointing, moulding, and rabbeting.	No equivalent	
(b) Machine controls and equipment.	5.1.3 Machine Control	
(1) A mechanical or electrical power control shall be provided on each machine to make it possible for the operator to cut off the power from each machine without leaving his position at the point of operation.	5.1.3.1 Each machine, whether mechanically or electrically driven, shall be provided with a device that will make it possible for the operator to cut off the power to the machine without leaving his normal operating position.	
(2) On machines driven by belts and shafting, a locking-type belt shifter or an equivalent positive device shall be used.	5.1.3.2 On machines driven by belts and shafting, belt shifters shall be easily accessible, protected from accidental contact, and within reach of the operator. They shall be equipped with a locking device to prevent accidental shifting.	
(3) On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power.	5.1.3.3 Electrically driven equipment shall be controlled with magnetic switches or other devices that will prevent automatic restarting of the machine after a power failure, if automatic restarting of the machine would create a hazard.	

Present Standard	Latest ANSI Standard	Comments
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No equivalent	5.1.3.4 On equipment that uses steam, air, or hydraulic power, or a power source other than electric, the valves or power supply controls shall automatically be positioned to "off" when the source of power is interrupted, in order to prevent automatic restarting or completion of the cycle if automatic restarting of the machine would create a hazard.	5.1.3.4 This is a new requirement in the ANSI standard 01.1-1975 written to cover woodworking machines or tools powered by other than electricity. Comments and information are solicited as to whether these requirements provide sufficient guidance and employee protection. What are the problems in modifying existing equipment.
(4) Power controls and operating controls should be located within easy reach of the operator while he is at his regular work location, making it unnecessary for him to reach over the cutter to make adjustments. This does not apply to constant pressure controls used only for setup purposes.	5.1.3.5 Power controls and operating controls shall be located within easy reach of the operator while he is at his regular work location. They shall be positioned so as to make it unnecessary for him to reach over a hazardous area to actuate the control.	
(5) On each machine operated by electric motors, positive means shall be provided for rendering such controls or devices inoperative while repairs or adjustments are being made to the machine they control.	5.1.3.6 On machines operated by electric motors or other sources of power, positive means of lockout shall be provided for rendering such controls or devices inoperative while repairs or adjustments are being made to the machines they control.	
(6) Each operating treadle shall be protected against unexpected or accidental tripping.	5.1.3.7 Each operating control shall be protected against unexpected or accidental activation.	
(7) Feeder attachments shall have the feed rolls or other moving parts so covered or guarded as to protect the operator from hazardous points.	5.1.4 Self-Feed. Feeder attachments, such as feed rolls, chains, sprockets, gears, or other moving parts that create a hazard shall be adequately safeguarded.	

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No equivalent	5.1.5 Speeds. The operating speeds shall be etched or otherwise permanently marked on all circular saw blades and shall not be run at a speed in excess of that recommended by the manufacturer. For blades without a manufacturer's recommendation, see A5.1.5.	5.1.5 This is a new requirement in the ANSI standard 01.1-1975. Comments and information are solicited as to whether there is a need to require the marking of saw blades to insure the correct operating speeds. Will marking the saw blade address the hazards presented by incorrect usage? Will this method sufficiently address and supplement the physical restriction of using an oversize saw blade as noted in (a)(5)?

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	A5.1.5 Speeds. In the absence of specifications by the saw blade manufacturer, Table A2 shows revolutions per minute for various speeds of saws.	
	Table A2 Saw Speeds at 12000 Peripheral Feed per Minute	
	Diameter (in) / Saw Speed (rpm) 8 / 5729 9 / 5093 10 / 4584 12 / 3820 14 / 3274 16 / 2865 18 / 2546 20 / 2292 22 / 2083 24 / 1910 26 / 1763 28 / 1637 30 / 1528	
(c) Hand-fed ripsaws.	6.1.2 Hand-Fed Ripsaws	
(1) Each circular hand-fed ripsaw shall be guarded by a hood which shall completely enclose that portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting	6.1.2.1 Each circular hand-fed ripsaw shall be provided with a hood-type guard that will cover the blade at all times when the blade is not in use. This may be accomplished by the use of a guard that will	(c)(1) A petitioner has requested OSHA to modify its present standard to include the use of a fixed or manually adjusted guard. Under what conditions would it be desirable to use a fixed or manually adjusted guard in

Present Standard	Latest ANSI Standard	Comments
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shall be arranged so that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut but it shall not offer any considerable resistance to insertion of material to saw or to passage of the material being sawed. The hood shall be made of adequate strength to resist blows and strains incidental to reasonable operation, adjusting, and handling, and shall be so designed as to protect the operator from flying splinters and broken saw teeth. It shall be made of material that is soft enough so that it will be unlikely to cause tooth breakage. The material should not shatter when broken, shall be nonexplosive, and should be no more flammable than wood. The hood shall be so mounted as to insure that its operation will be positive, reliable and in true alignment with the saw; and the mounting shall be adequate in strength to resist any reasonable side thrust or other force tending to throw it out of line.	automatically adjust to the thickness of the material being cut, or by a fixed or manually adjusted guard. If a fixed or manually adjusted guard is used, the space between the bottom of the guard and the material being cut shall not exceed 3/8 inch if 1-1/2 inches or more from the blade, and 1/4 inch if closer than 1-1/2 inches. 6.1.2.2 When the blade is in use, the hood-type guard shall enclose that portion of the blade above the material. 6.1.2.3 Hood-type guards shall be so designed and constructed as to resist blows and strains incidental to reasonable operation, adjusting, and handling, in order to protect the operator from flying splinters and broken saw teeth. 6.1.2.4 The hood shall be so mounted as to ensure that its operation will be positive, reliable, and in alignment with the saw. The mounting shall be adequate to resist any reasonable side thrust or other force that would disrupt alignment.	lieu of an automatically adjusting guard? Will the use of a manually adjusted guard present additional hazard exposure to the operator when resetting for each job? For any other reasons? Will the set-up dimensions indicated by ANSI (6.1.2.1) provide for sufficient operator protection? Will they restrict operation?
No equivalent	6.1.2.5 Where a hood-type guard cannot be used because of unusual shapes or cuts, a jig or fixture that will provide equal safety for the operator shall be used. On the completion of such operations, the guard shall be immediately replaced.	6.1.2.5 Comments are solicited to identify as many operations as possible requiring removal of the hood type guard on a hand-fed ripsaw.

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		Removal of a guard for special operations and the use of a push stick is covered by the present standard in (a)(5). What other machines and operations should be considered?
No equivalent	6.1.2.6 A push stick shall be used on short or narrow stock when there is a possibility of the hand contacting the cutting tool.	6.1.2.6 See comment 6.1.2.5 above.
(2) Each hand-fed circular ripsaw shall be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator. The spreader shall be made of hard tempered steel, or its equivalent, and shall be thinner than the saw kerf. It shall be of sufficient width to provide adequate stiffness or or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader shall be attached so that it will remain in true alignment with the saw even when either the saw or table is tilted, and should be placed so that there is not more than 1/2 inch space between the spreader and the back of the saw when the largest saw is mounted in the machine. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. On the completion of such operations, the spreader shall be immediately replaced.	6.1.2.7 Each hand-fed circular ripsaw shall be equipped with a spreader to minimize the possibility of material squeezing the saw or of material kickbacks. The spreader shall be made of tempered steel, or its equivalent, and shall be slightly thinner than the saw kerf. It shall be of sufficient width to provide adequate stiffness or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader shall be attached so that it will remain in true alignment with the blade, even when either the saw or table is tilted, and should be placed so that there is not more than 1/2-inch space between the spreader and the back of the blade when the recommended saw blade is in its maximum "up" position. If a blade smaller than the maximum permissible size is used, the spreader shall be moved to within 1/2 inch of the blade. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. On the completion of such operations, the spreader shall be immediately replaced.	

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(3) Each hand-fed circular ripsaw shall be provided with nonkickbacking fingers or dogs so located as to oppose the thrust or tendency of the saw to pick up the material or to throw it back toward the operator. They shall be signed to provide adequate holding power for all the thickness of materials being cut.	6.1.2.8 Each hand-fed circular ripsaw shall be provided with antikickback devices so located as to oppose the thrust or tendency of the saw blade to pick up the material or throw it back toward the operator. These devices shall be designed to provide holding power for all the thicknesses of material being cut.	(c)(3) A petitioner has suggested adopting the language from ANSI 01.1-1975. "Anti-kickback devices" is preferred to "non-kick-back fingers or dogs." Comments are solicited.
(d) Hand-fed crosscut table saws.	6.1.3 Hand-Fed Crosscut Table Saws (Including Trimmer Saws)	
(1) Each circular crosscut table saw shall be guarded by a hood which shall meet all the requirements of paragraph (c)(1) of this section for hoods for circular ripsaws.	6.1.3.1 Each circular crosscut table saw shall be guarded by a hood that shall meet all the requirements of this section for hoods.	
(2) Each circular crosscut saw should also be provided with a spreader which should meet all the requirements of paragraph (c)(2) of this section.	6.1.3.2 Each circular crosscut saw shall also be provided with a spreader that shall meet the requirements of 6.1.2.7.	
(e) Circular resaws.	6.1.5 Circular Resaws	
(1) Each circular resaw shall be guarded by a hood or shield, or metal above the saw. This hood or shield shall be so designed as to guard against danger from flying splinters or broken saw teeth.	6.1.5.1 Each circular resaw shall be guarded by a hood or shield above the saw that meets all the requirements of this section.	(e)(1) Comments and suggestions are solicited as to whether OSHA should permit the use of guards other than those made of metal. What types of materials should be permitted? What additional hazards can be anticipated with substitutions for the current metal requirement? Should a strength specification be given?

Present Standard	Latest ANSI Standard	Comments
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(2) Each circular resaw (other than self-feed saws with a roller or wheel at back of saw) shall be provided with a spreader fastened securely behind the saw. The spreader shall be slightly thinner than the saw kerf and slightly thicker than the saw disk.	6.1.5.2 Each circular resaw (other than self-feed saws with a roller or wheel at back of the saw) shall be provided with a spreader fastened securely behind the saw. The spreader shall be slightly thinner than the saw kerf.	
(f) Self-feed circular saws.	6.1.6 Self-Feed Circular Saws	
(1) Feed rolls and saws shall be protected by a hood or guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and the bottom of the guard shall come down to within three-eighths inch of the plane formed by the bottom or working surfaces of the feed rolls. This distance (three-eighths inch) may be increased to three-fourths inch, provided the lead edge of the hood is extended to be not less than 5-1/2 inches in front of the nip point between the front roll and the work.	6.1.6.1 Hoods. In addition to guards over blades as specified in this section, feed rolls shall be protected by a hood or guard to prevent the hands of the operator from coming in contact at any point with the inrunning roll nip. The bottom of the guard shall come down to within 3/8 inch of the plane formed by the bottom or working surfaces of the feed rolls and be at least 1-1/2 inches from the nip point. This distance (3/8 inch) may be increased to 3/4 inch, provided the lead edge of the hood is extended to be not less than 5-1/2 inches in front of the nip point between the front roll and the work.	
(2) Each self-feed circular ripsaw shall be provided with sectional nonkickback fingers for the full width of the feed rolls. They shall be located in front of the saw and so arranged as to be in continual contact with the wood being fed.	6.1.6.2 Antikickback Devices. Each self-feed circular ripsaw shall be provided with sectional antikickback devices for the full width of the feed rolls. They shall be located in front of the saw blade and so arranged as to be in continual contact with the stock being fed.	

Present Standard	Latest ANSI Standard	Comments
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(g) Swing cutoff saws. The requirements of this paragraph are also applicable to sliding cutoff saws mounted above the table.	6.1.7 Swing Cutoff Saws and Sliding Cutoff Saws Mounted above the Table. (For Radial Saws, see 6.1.9.)	(g) See (g)(2) for comment.
(1) Each swing cutoff saw shall be provided with a hood that will completely enclose the upper half of the saw, the arbor end, and the point of operation at all positions of the saw. The hood shall be constructed in such a manner and of such material that it will protect the operator from flying splinters and broken saw teeth. Its hood shall be so designed that it will automatically cover the lower portion of the blade, so that when the saw is returned to the back of the table, the hood will rise on top of the fence, and when the saw is moved forward the hood will drop on top of and remain in contact with the table or material being cut.	6.1.7.1 Hoods. Each saw shall be provided with a device that will completely enclose the upper half of the blade, the arbor end, and the point of operation at all positions of the saw. The device shall be constructed in such a manner as to protect the operator from flying splinters and broken saw teeth. This device shall be so designed that it will automatically cover the lower portion of the blade, so that when the saw is returned to the back of the table, the hood will rise on top of the fence, and when the saw is moved forward, the device will drop on top of and remain in contact with the table or material being cut.	(g)(1) Petitioners have requested modification of this requirement for the following reasons: 1. It does not recognize limitations in the use of a lower blade guard for specific operations. 2. Use of lower blade guard creates a hazard in itself. 3. The design criteria does not function when applied to swing saws. Comments and information are solicited to determine those design limitations restricting operations, and to identify the operations, and hazardous conditions employees are exposed to when the lower blade guard is used.
(2) Each swing cutoff saw shall be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel. Such a device shall not depend for its proper functioning upon any rope, cord, or spring. If there is a counterweight, the bolts supporting the bar and	6.1.7.2 Counterweights. Each swing cutoff saw shall be provided with an effective device to return the saw blade automatically to the back of the table without rebound when the saw is released at any point of its travel. Where the counterweight is exposed to contact, it shall be enclosed by a guard to the floor or by a	(g)(2) A petitioner has stated that a bar and counterweight arrangement is not feasible for sliding saws and has requested modification of the standard. Comments and information are solicited for alternative methods devised and in use to automatically return the saw blade to the back of the table without rebound.

Present Standard	Latest ANSI Standard	Comments
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counterweights shall be provided with cotter pins; and the counterweights shall be prevented from dropping by either a bolt passing through both the bar and counterweight, or a bolt put through the extreme end of the bar, or, where the counterweight does not encircle the bar, a safety chain attached to it.	safety device that will hold twice the weight of the counterweight.	
(3) Limit chains or other equally effective device shall be provided to prevent the saw from swinging beyond the front or back edges of the table, or beyond a forward position where the gullets of the lowest saw teeth will rise above the table top.	6.1.7.3 Limit Stops. A limit chain or other equally effective device shall be provided to prevent the saw blade from swinging beyond the front or back edge of the table.	
(4) Inverted swing cutoff saws shall be provided with a hood that will cover the part of the saw that protrudes above the top of the table or above the material being cut. It shall automatically adjust itself to the thickness of and remain in contact with the material being cut.	6.1.8 Inverted Swing Cutoff, Jump Saws, Underslung Saws. As required in 6.1.2.3, a hood-type guard that will cover the blade and shall extend at least 2 inches in front of the saw teeth when the blade is in "back" position shall be securely fastened to the table. In addition, a traveling guard shall move with the blade over the material and cover the exposed part of the blade above the material. The width of the hood of jump saws shall be limited so as to provide not more than 1/4-inch clearance on each side of the blade.	(g)(4) The ANSI standard 01.1-1975 (6.1.8) provides more specification data than the current rule. Comments are solicited on whether the current rule provides sufficient guidance and protection for the operator.

Present Standard 1910.213	Latest ANSI Standard C1.1-1975	Comments
(h) Radial saws. (1) The upper hood shall completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The upper hood shall be constructed in such a manner and of such material that it will protect the operator from flying splinters, broken saw teeth, etc., and will deflect sawdust away from the operator. The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut to give maximum protection possible for the operation being performed.	6.1.9 Radial Saws 6.1.9.1 Hoods and Guards. Each saw shall be provided with a device that will completely enclose the upper portion of the blade down to a point that includes the end of the saw arbor. The upper hood shall be so constructed as to protect the operator from flying splinters and broken saw teeth, and to deflect sawdust away from the operator. The sides of the lower exposed portion of the saw blade shall be guarded from the tips of the blade teeth inward radially with no greater than 3/8-inch gullet exposure. The device shall automatically adjust itself to the thickness of the stock and remain in contact with the stock being cut for the 90° blade position (0° bevel) throughout the full working range of miter position. A permanent label not less than 1-1/2 inches X 3/4 inch shall be affixed to the guard visible from the normal operating position, reading as follows: WARNING: TO AVOID INJURY, SHUT OFF POWER BEFORE CLEARING A JAMMED LOWER GUARD Such a label shall be colored standard danger red or orange in accordance with American National Standard Safety Color Code for Marking Physical Hazards, Z53.1-1971.	(h)(1) Petitioners have requested modification of this requirement for the following reasons: 1. Lower blade guards are not commercially available that afford reasonable operator safety and do not interfere with or restrict some operations. Re: bevel and compound cuts. 2. The lower blade guard is a hazard in itself under specific conditions. 3. The standard limits the ability to substitute a device which will not obstruct the operator's view. It has been suggested that the warning label (ANSI 01.1-1975) (6.1.9.1) include waiting for the blade to stop. Comments and information are solicited to determine the guard design limitations restricting operation and to identify the operations and hazardous conditions employees are exposed to when the lower blade guard is used. Specifically address comments to the range limitations for bevel and compound cuts when using the automatic guard. Can all miter cuts be accomplished with the guard in place?

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
No equivalent	6.1.9.2 Spreaders. When radial saws are used for ripping, a spreader shall be provided and shall be aligned with the saw blade.	
(2) Each radial saw used for ripping shall be provided with nonkickback fingers or dogs located on both sides of the saw so as to oppose the thrust or tendency of the saw to pick up the material or to throw it back toward the operator. They shall be designed to provide adequate holding power for all the thicknesses of material being cut.	6.1.9.3 Antikickback Devices. Antikickback devices located on both sides of the saw blade on the outfeed side, so as to oppose the thrust or tendency of the blade to pick up the material or to throw it back toward the operator, shall be used on each radial saw used for ripping. These devices shall be designed to provide adequate holding power for all the thicknesses of material being cut.	
	6.1.9.4 Adjustable Stops and Return Devices	
(3) An adjustable stop shall be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations.	6.1.9.4.1 An adjustable stop shall be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations. A limit chain or other equally effective device shall be provided to prevent the saw blade from sliding beyond the edge of the table; or the table shall be extended to eliminate over-run.	(h)(3) A petitioner suggests the wording "adjustable stop" be changed to "effective limiting device." Comments are solicited. What are the devices other than an adjustable stop which can be used to prevent forward travel of the blade beyond the point necessary to complete the cut? What are the devices other than a limit chain which can keep the saw blade from going beyond the edge of the table? Will the devices used to substitute for adjustable stops and limit chains offer equal operator protection from the hazards?

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
(4) Installation shall be in such a manner that the front end of the unit will be slightly higher than the rear, so as to cause the cutting head to return gently to the starting position when released by the operator.	6.1.9.4.2 On any manually operated saw, installation shall be such that the front of the machine is slightly higher that the rear, or some other means shall be provided so that the cutting head will not roll or move out on the arm away from the column as a result of gravity or vibration. A permanent label not less than 1-1/2 inches X 3/4 inch shall be affixed to the cutting head visible from the normal crosscut operating position, reading as follows: WARNING: TO AVOID INJURY, RETURN CARRIAGE TO THE FULL REAR POSITION AFTER EACH CROSSCUT TYPE OF OPERATION Such a label shall be colored standard caution yellow in accordance with American National Standard Z53.1-197.	(h)(4) A petition has been received requesting modification of the standard to eliminate the present method as unfeasible and to identify an alternative method of returning the cutting head to the starting position. The ANSI standard 01.1-1975 (6.1.9.4.2) deletes the requirement for self-return of the cutting head but requires a means to prevent it from creeping out on the arm away from the column. Does the current method always insure return of the blade to the starting position? Can the carriage bearings, if adjusted to the manufacturer's specification to eliminate end-play, allow for the arm to be tilted at an angle not to exceed that which would require major modification to the table for in and out feed? Will the hazard be correctly addressed and are there any other safety measures required if the carriage has to be returned manually to the rear position and the cutting head is prevented from accidently moving out on the arm? Other than tilting the front end of the unit what devices can be employed to prevent the cutting head from moving out on the arm?
(5) Ripping and ploughing shall be against the direction in which the saw turns. The direction of the saw rotation shall be conspicuously marked on the hood. In addition, a permanent label not less than 1-1/2 inches by 3/4 inch shall be affixed to the rear of the guard or approximately	6.1.9.5 Direction of Feed. Ripping and ploughing shall be against the direction in which the saw blade turns. The direction of the saw blade rotation shall be conspicuously marked on the hoods. In addition, a permanent label not less than 1-1/2 inches X 3/4 inch shall be affixed to	(h)(5) A comment has been received stating that the wording for the label in our present standard does not cover the hazards employees are exposed to when using the machine for operations other than ripping and ploughing.

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the level of the arbor, reading as follows: "Danger: Do Not Rip or Plough From This End." Such a label should be colored standard danger red.	the end of the guard at which the blade teeth exit the upper guard during operation. The label shall be at approximately the level of the arbor and shall read as follows: DANGER: TO AVOID INJURY, DO NOT FEED MATERIAL INTO CUTTING TOOL FROM THIS END Such a label shall be colored standard red or orange in accordance with American National Standard, Z53.1-1971.	
(1) Bandsaws and band resaws.	6.2 Band Saws and Band Resaws	
(1) All portions of the saw blade shall be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table. Bandsaw wheels shall be fully encased. The outside periphery of the enclosure shall be solid. The front and back of the band wheels shall be either enclosed by solid material or by wire mesh or perforated metal. Such mesh or perforated metal shall be not less than 0.037 inch (U. S. Gage No.20), and the openings shall be not greater than three-eighths inch. Solid material used for this purpose shall be of an equivalent strength and firmness. The guard for the portion of the blade between the sliding guide and the upper-saw-wheel guard shall protect the saw blade at the front and outer side. This portion of the guard shall be self-adjusting to raise and lower with the	6.2.1 Enclosing Band Saw Blades. All portions of the saw blade shall be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table. Band saw wheels shall be fully encased. The outside periphery of the enclosure shall be solid. The front and back of the band wheels shall be either enclosed by solid material or by wire mesh or perforated metal. Such mesh or perforated metal shall be not less than 0.037 inch (U. S. Gage No. 20), and the openings shall be not greater than 3/8 inch. Solid material used for this purpose shall be of an equivalent strength and firmness. The guard for the portion of the blade between the sliding guide and the upper saw wheel guard shall enclose the saw blade at the front and outer side. This portion of the guard shall be self-adjusting to raise and lower with the guide.	(1)(1) It has been suggested that the braking requirement be removed from the present standard since the hazard does not exist when the band wheels are properly guarded. The ANSI standard 01.1-1975 (6.2.1) has deleted as redundant a part of the specification requirement for the upper wheel guard. It addreeses the braking requirement to the hazard exposed by a coasting blade when the machine is shut off and left unattended rather than to blade breakage. Comments are solicited to determine the extent of the hazard exposure when a machine is shut off but left unattended. Does the hazard caused by a coasting wheel still exist when attempting to remove a broken blade?

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guide. The upper-wheel guard shall be made to conform to the travel of the saw on the wheel, and the top member of the guard should have at least a 2-inch clearance outside the saw and be lined with smooth material, perferably metal. Effective brakes should be provided to stop the wheel in case of blade breakage.	Effective braking action shall be provided to minimize the potential hazard of coasting when the machine is shut off and left unattended.	
(2) Each bandsaw machine shall be provided with a tension control device to indicate a proper tension for the standard saws used on the machine, in order to assist in the elimination of saw breakage due to improper tension.	6.2.2 Tension. Each band saw machine shall be provided with a tension control device to indicate proper tension for the saw blades used on the machine.	
(3) Feed rolls of band resaws shall be protected with a suitable guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and the edge of the guard shall come to within three-eighths inch of the plane formed by the inside face of the feed roll in contact with the stock being cut.	6.2.3 Feed Rolls. Feed rolls of band resaws shall be equipped with guards to prevent the hands of the operator from coming into contact with the roll nip points. The edge of the guard shall come to within 3/8 inch of the plane formed by the inside face of the feed roll in contact with the stock being cut and the work table.	
(j) Jointers.	6.3 Jointers and Planers	
	6.3.1 Point of Operation	
(1) Each hand-fed planer and jointer with horizontal head shall be equipped with a cylindrical cutting head, the knife projection of which shall not exceed one-eighth inch beyond the cylindrical body of the head.	6.3.1.1 Each hand-fed planer and jointer with horizontal or vertical head shall be equipped with a cylindrical cutting head, the knife projection of which shall not exceed 1/8 inch beyond the cylindrical body of the head.	(j)(1) Comments and suggestions are solicited as to whether the requirement should be expanded to include vertical head machines.

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No equivalent	6.3.1.2 Square cutting heads shall not be used.	
(2) The opening in the table shall be kept as small as possible. The clearance between the edge of the rear table and the cutter head shall be not more than one-eighth inch. The table throat opening shall be mot more than 2-1/2 inches when tables are set or aligned with each other for zero cut.	6.3.1.3 The opening in the table shall be kept as small as possible. The clearance between the rear table and the cutting head circle or knives shall be not more than 1/8 inch. The table throat opening shall be not more than 2-1/2 inches when tables are set or aligned with each other for zero cut.	
(3) Each hand-fed jointer with a horizontal cutting head shall have an automatic guard which will cover all the section of the head on the working side of the fence or gage. The guard shall effectively keep the operator's hand from coming in contact with the revolving knives. The guard shall automatically adjust itself to cover the unused portion of the head and shall remain in contact with the material at all times.	6.3.2 Automatic Guards 6.3.2.1 Each hand-fed jointer shall have an automatic guard that will cover all the sections of the cutting head on the working side of the fence or guard. The guard shall be designed to prevent accidental contact with the revolving knives and shall automatically adjust itself to cover the unused portion of the head and shall remain in contact with the material at all times.	
(4) Each hand-fed jointer with horizontal cutting head shall have a guard which will cover the section of the head back of the gage or fence.	6.3.2.2 Each hand-fed jointer with horizontal cutting head shall have a guard that will cover the section of the head in back of the gage or fence.	
(5) Each wood jointer with vertical head shall have either an exhaust hood or other guard so arranged as to enclose completely the revolving head, except for a slot of such width as may be necessary and convenient for the application of the material to be jointed.	6.3.3 Vertical Head Jointers. Each wood jointer with vertical head shall have either an exhaust hood or other guard so arranged as to enclose completely the revolving head, except for a slot of such width as may be necessary for the application of the material to be jointed.	

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(k) Tenoning machines.	6.4 Tenoning Machines	
	6.4.2 Feed Chains and Sprockets	
(1) Feed chains and sprockets of all double end tenoning machines shall be completely enclosed, except for that portion of chain used for conveying the stock.	6.4.2.1 Feed chains and sprockets of all double end tenoning machines shall be completely enclosed, except for that portion of chain used for conveying the stock.	
(2) At the rear ends of frames over which feed conveyors run, sprockets, and chains shall be guarded at the sides by plates projecting beyond the periphery of sprockets and the ends of lugs.	6.4.2.2 At the rear ends of frames over which feed coveyors run, sprockets and chains shall be guarded at the sides by plates projecting beyond the periphery of sprockets and the ends of lugs.	
(3) Each tenoning machine shall have all cutting heads, and saws if used, covered by metal guards. These guards shall cover at least the unused part of the periphery of the cutting head. If such a guard is constructed of sheet metal, the material used shall be not less than one-sixteenth inch in thickness, and if cast iron is used, it shall be not less than three-sixteenths inch in thickness.	6.4.1 Guarding of Cutting Heads 6.4.1.1 Each tenoning machine shall have all cutting heads, and saws if used, covered by guards. These guards shall cover at least the unused part of the periphery of the cutting head.	(k)(3) Comments and suggestions are solicited as to whether OSHA should permit the use of guards other than those made of metal. What types of materials should be permitted? What additional hazards can be anticipated with substitutions for the current metal requirement? Should a strength specification be given?
(4) Where an exhaust system is used, the guard shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than that specified in subparagraph (3) of this paragraph.	6.4.1.2 Where an exhaust system is used, the guard may form part or all of the exhaust hood.	(k)(4) Same comment solicited as in (k)(3) above.

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No equivalent	6.4.1.3 Where space permits, the rear end of the frame over which the feed conveyors run should be so extended that the material, as it leaves the machine, will by guided to a point within easy reach of the person "taking away" at the rear of the tenoner.	
No equivalent	6.4.3 Hand-Fed Tononers. Hand-fed tenoning machines shall be provided with a clamping or "holddown" device on the fixture.	
(1) Boring and mortising machines.	6.5 Boring and Mortising Machines	
(1) Safety bit chucks with no projecting set screws shall be used.	6.5.1 Chucks. Chucks with projecting set screws shall not be used.	
(2) Boring bits should be provided with a guard that will enclose all portions of the bit and chuck above the material being worked.	6.5.5 Boring Bits. Boring bits shall be provided with a guard that will prevent accidental contact with the bit chuck above the material being worked.	
(3) The top of the cutting chain and driving mechanism shall be enclosed.	6.5.2 Chain Mortisers. The top of the cutting chain and driving mechanism shall be enclosed.	
(4) If there is a counterweight, one of the following or equivalent means shall be used to prevent its dropping:	6.5.3 Counterweights. Where there is a counterweight, suitable means shall be used to prevent its dropping.	(1)(4) The ANSI standard 01.1-1975 (6.5.3) has deleted reference to the specification criteria (1)(4)(i)-(1)(4)(iv) in the present standard. The standard limits the requirement to preformance language to gain method flexibility. Comments are invited to determine if the performance language gives as sufficient guidance and operator protection as is provided in our present standard.
(i) It shall be bolted to the bar by means of a bolt passing through both bar and counterweight;	No equivalent	

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(ii) A bolt shall be put through the extreme end of the bar;	No equivalent	
(iii) Where the counterweight does not encircle the bar, a safety chain shall be attached to it;	No equivalent	
(iv) Other types of counterweights shall be suspended by chain or wire rope and shall travel in a pipe or other suitable enclosure wherever they might fall and cause injury.	No equivalent	
(5) Universal joints on spindles of boring machines shall be completely enclosed in such a way as to prevent accidental contact by the operator.	6.5.4 Universal Joints. Universal joints on spindles of boring machines shall be guarded in such a way as to prevent accidental contact by the operator.	
(6) Each operating treadle shall be covered by an inverted U-shaped metal guard, fastened to the floor, and of adequate size to prevent accidental tripping.	6.13 Guarding Operating Treadles. Each operating treadle shall be covered by a device which is adequate to avoid accidental activation or tripping.	
(m) Wood shapers and similar equipment.	6.6 Wood Shapers and Similar Machines	
	6.6.1 Guarding of Cutting Heads	
(1) The cutting heads of each wood shaper, hand-fed panel raiser, or other similar machine not automatically fed, shall be enclosed with a cage or adjustable guard so designed as to keep the operator's hand away from the cutting edge. The diameter of circular shaper guards shall be not less than the greatest diameter of the cutter.	6.6.1.1 The cutting heads of each wood shaper, hand-fed panel raiser, or other similar machine not automatically fed, shall be enclosed with a cage or adjustable guard so designed as to minimize operator contact with cutterhead. The diameter of circular shaper guards shall be greater than the diameter of the cutter.	(m)(1) The ANSI standard 01.1-1975 (6.6.1.1) reflects the availablility and industry acceptance of free running warning devices that attach to the shaper spindle. It has been suggested that the ANSI provision be incorporated in the OSHA standard but limited to use only when the operation

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In no case shall a warning device of leather or other material attached to the spindle be acceptable.	In no case shall a warning device of leather or similar material attached to the spindle. A warning device attached to the spindle shall stop rotating on contact.	precludes the use of a guard. Comments are solicited to identify those operations which cannot be accomplished with the guard in place.
(2) Cylindrical heads should be used whenever the nature of the work will permit. Single cutter knives in shaper heads shall not be used unless properly balanced.	6.6.1.2 Cylindrical heads should be used whenever the nature of the work will permit. Single cutter knives in shaper heads shall not be used unless properly balanced.	
(3) All double-spindle shapers shall be provided with a spindle starting and stopping device for each spindle.	6.6.2 Single Starting and Stopping Devices. All double-spindle shapers shall be provided with a spindle starting and stopping device for each spindle.	
No equivalent	6.6.1.3 Templates, jigs, and fixtures that will remove the operator's hands from the point of operation shall be used whenever the nature of the work will permit.	
(n) Planing, molding, sticking, and matching machines.	6.7 Planing, Molding, Sticking, and Matching Machines	
	6.7.1 Guarding of Cutting Heads	
(1) Each planing, molding, sticking, and matching machine shall have all cutting heads, and saws if used, covered by a metal guard. If such a guard is constructed of sheet metal, the material used shall be not less than 1/16 inch in thickness, and if cast iron is used, it shall be not less than three-sixteenths inch in thickness.	6.7.1.1 Each planing, molding, sticking, and matching machine shall have all cutting heads and saws, if used, covered by a guard to minimize accidental contact with the cutting head.	(n)(1) Comments and suggestions are solicited as to whether OSHA should permit the use of guards other than those made of metal. What types of materials should be permitted? What additional hazards can be anticipated with substitutions for the current metal requirement? Sould a strength specification be given?

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(2) Where an exhaust system is used, the guards shall form part or all of the exhaust hood shall be constructed of metal of a thickness not less than that specified in subparagraph (1) of this paragraph.	6.7.1.2 Where an exhaust system is used, the guards may form part or all of the exhaust hood.	(n)(2) Same comments solicited as for (n)(1) above.
(3) Feed rolls shall be guarded by a hood or suitable guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point The guard shall be fastened to the frame carrying the rolls so as to remain in adjustment for any thickness of stock.	6.7.2 Feed Rolls 6.7.2.1 Feed rolls shall be provided with a guard or hood to minimize operator contact with the roll nip points. The guard shall remain in adjustment for any thickness of stock.	
(4) Surfacers or planers used in thicknessing multiple pieces of material simultaneously shall be provided with sectional infeed rolls having sufficient yield in the construction of the sections to provide feeding contact pressure on the stock, over the permissible range of variation in stock thickness specified or for which the machine is designed. In lieu of such yielding sectional rolls, suitable section kickback finger devices shall be provided at the infeed end.	6.7.2.2 Surfacers or planers used in processing multiple pieces of material simultaneously shall be provided with sectional in-feed rolls having sufficient yield in the construction of the sections to provide feeding contact pressure on the stock over the permissible range of variation in stock thickness for which the machine is designed.	(n)(4) Comments and information are solicited to identify the hazards employees are exposed to if suitable section kickback finger devices are provided at the infeed end of the machines in place of the yielding sectional rolls?
(o) Profile and swing-head lathes and wood heel turning machine.	6.8 Profile and Swing-Head Lathes (Including Wood Heel Turning Machines) 6.8.1 Guarding of Cutting Heads	(o) Information is solicited to currently define these terms.
(1) Each profile and swing-head lathe shall have all cutting heads covered by a metal guard. If such a guard is constructed of sheet metal, the material	6.8.1.1 Each profile and swing-head lathe shall have all cutting heads covered by a guard to minimize accidental contact with the cutting head.	(o)(1) Comments and suggestions are solicited as to whether OSHA should permit the use of guards other than those made of metal. What types of materials should be

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used shall be not less than one-sixteenth inch in thickness; and if cast iron is used, it shall not be less than three-sixteenths inch in thickness.		permitted? What additional hazards can be anticipated with substitutions for the current metal requirement? Should a strength specification be given?
(2) Cutting heads on wood-turning lathes, whether rotating or not, shall be covered as completely as possible by hoods or shields, which should be hinged to the machines so that they can be thrown back for making adjustments.	6.8.1.2 Cutting heads on wood-turning lathes, whether rotating or not, shall be covered as completely as possible by hoods or shields.	(o)(2) Comments and information are solicited to determine whether sufficient guidance would be provided without indicating a hinged construction for the guard to facilitate set-up.?
(3) Shoe last and spoke lathes, doweling machines, wood heel turning machines, and other automatic wood-turning lathes of the rotating knife type shall be equipped with hoods enclosing the cutter blades completely except at the contact points while the stock is being cut.	6.8.1.3 All automatic wood-turning machines of the rotating-knife type shall be equipped with guards enclosing the cutter blades completely, except at the contact points while the stock is being cut.	
(4) Lathes used for turning long pieces of wood stock held only between the two centers shall be equipped with long curved guards extending over the tops of the lathes in order to prevent the work pieces from being thrown out of the machines if they should become loose.	6.8.1.4 Lathes used for turning long pieces of wood stock held only between the two centers shall be equipped with means to prevent the workpieces from being thrown out of the machines.	(o)(4) Comments are solicited to determine if the performance language in ANSI 01.1-1975 (6.8.1.4) gives sufficient guidance and operator protection to replace the specification criteria in our present standard. Data is requested that will help identify means of guarding other than "long curved guards" which will provide equal protection for employee safety.
No equivalent	6.8.1.5 Guards covering the workpiece in wood-turning lathes should be so constructed to permit observation of the turning operations.	

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No equivalent	6.8.1.6 Wood-turning lathes shall be equipped with suction hoods, properly connected to efficient exhaust systems that will remove, at their point of origin, the chips and dusts produced.	
(5) Where an exhaust system is used, the guard shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than that specified in subparagraph (1) of this paragraph.	6.8.1.7 An exhaust system may form part or all of the guard.	(o)(5) Comments and suggestions are solicited as to whether OSHA should permit the use of guards other than those made of metal. What types of materials should be permitted? What additional hazards can be anticipated with substitutions for the current metal requirement? Should a strength specification be given?
No equivalent	6.8.1.8 Tool rests shall be securely fastened to avoid accidental movement.	
(p) Sanding machines.	6.9 Sanding Machines.	
(1) Feed rolls of self-feed sanding machines shall be protected with a semicylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and firmly secured to the frame carrying rolls so as to remain in adjustment for any thickness of stock. The bottom of the guard should come down to within three-eights inch of a plane formed by the bottom or contact face of the feed roll where it touches the stock.	6.9.1 Feed Rolls. Feed rolls of self-feed sanding machines shall be protected with a semicylindrical guard to prevent the hands of the operator from coming in contact with the roll nip points. The guard and its mounting shall be designed to remain in adjustment for any thickness of stock. The bottom of the guard should come down to within 3/8 inch of a plane formed by the bottom or contact face of the feed roll where it touches the stock.	(p)(1) Comments are solicited to determine the need to clarify the guard construction requirement for a heavy material. Should a strength criteria be established? What types of exposures and operating conditions would determine the strength requirement?

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(2) Each drum sanding machine shall have an exhaust hood, or other guard if no exhaust system is required, so arranged as to enclose the revolving drum, except for that portion of the drum above the table, if a table is used, which may be necessary and convenient for the application of the material to be finished.	6.9.2 Drum Sanding Machines. Each drum sanding machine shall have an exhaust hood, or other guard, so arranged as to enclose the revolving drum, except for the working portion of the drum above the table.	
(3) Each disk sanding machine shall have the exhaust hood, or other guard is no exhaust system is required, so arranged as to enclose the revolving disk, except for that portion of the disk above the table, if a table is used, which may be necessary for the application of the material to be finished.	6.9.3 Disk Sanding Machines. Each disk sanding machine shall have the exhaust hood, or other guard, so arranged as to enclose the revolving disk, except for that portion of the disk above the table. NOTE: The distance between the disk and the table edge shall be kept at a minimum.	
	6.9.4 Belt Sanding Machines	
(4) Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs on to a pulley. These guards shall effectively prevent the hands or fingers of the operator from coming in contact with the nip points. The unused run of the sanding belt shall be guarded against accidental contact.	6.9.4.1 Belt sanders shall have all pulleys enclosed including sides and periphery. This does not include the working end of an edge sander. An exhaust hood may be part of the guard. 6.9.4.2. The unused run of the belt shall be guarded.	(p)(4) Comments are solicited to identify those hazards, if any, presented by using the working edge of the sander for curved work. Should consideration be given to additional protection for operator safety?
	6.11 Routers	
No equivalent	6.11.1 The pulleys, spindles, and cutting tools of stationary routers shall by guarded.	

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(q) Veneer cutters and wringers.		(q) Information is solicited to define the word "wringer." Is it currently in use?
(1) Veneer slicer knives shall be guarded to prevent accidental contact with knife edge, at both front and rear.	7.5 Veneer Slicer. The knife shall be guarded at front and rear to prevent accidental contact with the knife edge.	
(2) Veneer clippers shall have automatic feed or shall be provided with a guard which will make it impossible to place a finger or fingers under the knife while feeding or removing the stock.	7.6 Veneer Clippers 7.6.1 Guarding Clippers. Clippers shall be provided with a guard on both in-feed and out-feed sides to protect the operator and helper.	
(3) Sprockets on chain or slat-belt conveyors shall be enclosed.	Covered under machines and equipment by reference to ANSI B15.1-1972.	
(4) Where practicable, hand and foot-power quillotine veneer cutters shall be provided with rods or plates or other satisfactory means, so arranged on the feeding side that the hands cannot reach the cutting edge of the knife while feeding or holding the stock in place.	No equivalent	(q)(4) A comment has been received that the suggested methods of guarding are impractical and that the safeguarding can be addressed in (q)(2) if modified to suit ANSI 01.1-1975 (7.6.1). Comments are solicited.
(5) Power-driven guillotine veneer cutters, except continuous feed trimmers, shall be equipped with:	7.6.3 Power-Driven Guillotine Veneer Cutters (except Continuous Feed Trimmers) 7.6.3.1 Power-driven veneer cutters shall be equipped with either of the following:	

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(i) Starting devices which require the simultaneous action of both hands to start the cutting motion and of at least one hand on a control during the complete stroke of the knife; or	(1) A starting device that requires the simultaneous action of both hands to start the cutting motion and at least one hand on a control during the complete stroke of the knife; or	
(ii) An automatic guard which will remove the hands of the operator from the danger zone at every descent of the blade, used in conjunction with one-hand starting devices which require two distinct movements of the device to start the cutting motion, and so designed as to return positively to the nonstarting position after each complete cycle of the knife.	(2) An automatic device that will remove the hands of the operator from the danger zone at every descent of the blade, used in conjunction with one-hand starting devices that require two distinct movements of the device to start the cutting motion. 7.6.3.2. All power-driven veneer cutters shall be so designed that the knife positively returns to the starting position after each complete cycle of the knife.	
(6) Where two or more workers are employed at the same time on the same power-driven guillotine veneer cutter equipped with two-hand control, the device shall be so arranged that each worker shall be required to use both hands simultaneously on the controls to start the cutting motion, and at least one hand on a control to complete the cut.	7.6.3.3 Where two or more workers are employed at the same time on the same power-driven guillotine veneer cutter equipped with two-hand control, the device shall be so arranged that each worker shall be required to use both hands simultaneously on the controls to start the cutting motion, and at least one hand on a control to complete the cut.	
(7) Power-driven guillotine veneer cutters, other than continuous trimmers, shall be provided, in addition to the brake or other stopping mechanism, with a emergency device which will prevent the machine from operating in the event of failure of the brake when the starting mechanism is in the nonstarting position.	7.6.3.4 In addition to the brake or other stopping mechanism, a nonrepeat device that will prevent the machine from operating in the event of a mechanical failure shall be provided.	

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No equivalent	7.6.3.5 Where no other device serves as protection, a guard running the length of the knife shall be installed on the in-feed side.	7.6.3.5-7.6.3.9 The ANSI standard 01.1-1975 has addressed these 5 additional hazards for power-driven guillotine veneer cutters not covered in the current standard. Comments are solicited on the suggestion to expand 1910.213 to cover these hazards.
No equivalent	7.6.3.6 A protective device, such as side shields, shall be provided on the out-feed side.	
No equivalent	7.6.3.7 A protective device for the knife edge shall be provided for use when the knife is being transported.	
No equivalent	7.6.3.8 Positive means of opening and locking the control circuit and supporting the mechanism in the "up" position shall be provided for use during knife changes.	
No equivalent	7.6.3.9 When the hold-down clamp and the knife are in their uppermost positions, the knife edge shall not extend below the lower edge of the hold-down clamp.	
	7.4 Veneer Lathe	
	7.4.1 A mechanical lock shall be provided to prevent the backup roll from closing until activated by the operator.	7.4.1-7.4.8 The ANSI standard 01.1-1975 has addressed these 8 additional hazards for veneer lathes not previously covered in the old standard. Comments are solivited on the suggestion to expand 1910.213 to cover these hazards.
No equivalent	7.4.2 A guard or positive interlock and necessary hydraulic or air controls shall be provided to prevent forward movement of the charger, if such movement may be hazardous.	

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No equivalent	7.4.3 Positive means shall be provided to hold the head in the open position while the knife is being serviced.	
No equivalent	7.4.4 A protective device for the knife edge shall be provided for use when the knife is being transported.	
No equivalent	7.4.5 Where there is a hazard from "exploding" logs, both lathe operator's and charger operator's stations shall be protected against flying slabs and chips.	
No equivalent	7.4.6 Means shall be provided in knife-grinding areas to drain cleaning or cooling liquids from the work stations.	
No equivalent	7.4.7 Knives and other cutting equipment shall have planned storage areas.	
No equivalent	7.4.8 The area under the elevating ramp (tipple) from the lathe to the stock trays shall be guarded to prevent entrance while the lathe is in operation.	
(r) Miscellaneous woodworking machines.		
(1) The feed rolls of roll type glue spreaders shall be guarded by a semicylindrical guard. The bottom of the guard shall come to within three-eighths inch of a plane formed by bottom or contact face of the feed roll where it touches the stock.	6.12 Glue Spreaders (Feed-Roll Type). Where there is a hazard to the operator, the feed roll shall be guarded at all nip points. The bottom of the guard at the infeed side shall come to within 3/8 inch of a horizontal plane formed by the bottom or contact face of the feed roll and the top surface of the stock and at least 1-1/2 inches away from the contact point. It is recommended that a reversing bar or switch, or a kickplate be used in addition to the nip guard.	(r)(1) Comments are solicited on the suggestion to modify the current standard to additionally require locating the guard a specific distance away from the feed rolls of a glue spreader and to further recommend the use of a reversing bar or switch or kickplate.

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(2) Drag saws shall be so located as to give at least a 4-foot clearance for passage when the saw is at the extreme end of the stroke; or if such clearance is not obtainable, the saw and its driving mechanism shall be provided with a standard enclosure.	7.3 Saws 7.3.1 Log Cutoff Saws. Saws shall be so located as to give safe clearance for passage when the saw is at the extreme end of the stroke, or if such clearance is not obtainable, the saw and its driving mechanism shall be provided with a standard enclosure.	(r)(2) Comments and information are solicited for the correct word usage. Can drag saws and log cutoff saws be used interchangably and if so which is more commonly used?
No equivalent	7.3.2 Circular Cutoff Saws. The operator shall be shielded from sawdust and flying chips.	
(3) For combination or universal woodworking machines each point of operation of any tool shall be guarded as required for such a tool in a separate machine.	6.10 Combination or Universal Woodworking Machines. For combination or universal woodworking machines, each point of operation shall be guarded as specified in the rules of this standard for each separate machine. Such machines shall be provided with a separate stopping and starting device at each point of operation.	(r)(3) Comments and information are solicited to determine the hazard exposure and conditions under which combination woodworking machines would require individual emergency start and stop controls at each point of operation.
(4) The mention of specific machines in paragraphs (a) thru (q) and this paragraph (r) of this section, inclusive, is not intended to exclude other woodworking machines from the requirement that suitable guards and exhaust hoods be provided to reduce to a minimum the hazard due to the point of operation of such machines.	6.14 Other Machines Not Excluded. The mention of specific machines in 6.1 through 6.12 inclusive, is not intended to exclude other woodworking machines from the requirement that suitable guards and exhaust hoods be provided. Reduce to a minimum the hazard due to the point of operation of such machines.	

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
	9.1 Inspection and Maintenance	§1910.213(s) A comment has been received stating that §1910.213(s) except for (s)(3) and (4) does not address the major machine maintenance problem areas but concerns itself primarily with accessory tooling and safe operating procedures. The ANSI standard 01.1-1975 (9.1.1.1 and 9.1.1.2) addresses new requirements for the inspection and maintenance of woodworking equipment not covered in the current standard. Specific comments should be directed, but not limited, to the following requirements: 1. Regular and periodic inspection 2. Inspection by qualified personnel 3. Minimum recordkeeping requirements 4. Inspection elements 5. Operator training in safe operating procedures.
No equivalent	9.1.1 Inspection	
	9.1.1.1 Emphasis is placed upon the importance of maintaining systematic inspection of all woodworking machines and safety equipment to assist in the discovery or detection of developing defects and to permit their prompt correction. Inspections are to be performed by a plant safety engineer, foreman, supervisor, or other qualified personnel familiar with the machinery. Inspection shall determine that safety equipment is in working condition and in place, that noise/time exposure levels are within allowable limits, that the machine operator is properly trained in safe operating procedures of the equipment, and that the operator and machine are equipped with the safety accessories suitable for the hazards of the operation.	
No equivalent	9.1.1.2 Each machine is to be inspected at least every six months, and a (rugged) tag or card affixed to the machine. It shall contain a minimum of the following: machine number, inspection date, period of validity, and signature of a qualified person familiar with the machinery.	

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
(s) Inspection and maintenance of woodworking	9.1.2 Maintenance	
(1) Dull, badly set, improperly filed, or improperly tensioned saws shall be immediately removed from service, before they begin to cause the material to stick, jam, or kick back when it is fed to the saw at normal speed. Saws to which gum has adhered on the sides shall be immediately cleaned.	9.1.2.1 Dull, badly set, improperly filed, or improperly tensioned saw blades shall be immediately removed from service before they result in causing the material to stick, jam, or kick back when it is fed to the saw at normal speed. Saw blades to which gum has adhered on the sides shall be cleaned before the thickness of the gum is approximately two-thirds the tooth set. It is strongly recommended that users obtain and follow instructions from the saw blade manufacturers for proper maintenance of all saw blades. Band saw wheels should be kept clean and free from accumulations of sap, gum, or resins.	
(2) All knives and cutting heads of woodworking machines shall be kept sharp, properly adjusted, and firmly secured. Where two or more knives are used in one head, they shall be properly balanced.	9.1.2.2 All knives and cutting heads of woodworking machines shall be kept sharp, properly adjusted, and firmly secured. Cutting heads shall not generate sensible vibration.	
(3) Bearings shall be kept free from lost motion and shall be well lubricated.	9.1.2.3 Mounted cutting tools or cutting tool arbors, or both, shall be free of excessive lateral and radial play. Bearings shall have proper lubrication.	
(4) Arbors of all circular saws shall be free from play.		
(5) Sharpening or tensioning of saw blades or cutters shall be done only by persons of demonstrated skill in this kind of work.	9.1.2.4 Sharpening or tensioning of saw blades or cutters shall be done only by persons of demonstrated skill in this kind of work.	

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
(6) Emphasis is placed upon the importance of maintaining cleanliness around woodworking machinery, particularly as regards the effective functioning of guards and the prevention of fire hazards in switch enclosures, bearings, and motors.	9.1.2.5 Cleanliness around woodworking machinery is to be maintained to ensure proper functioning of guards, bearings, motors, and electrical equipment, and to prevent generation of fire hazards.	
(7) All cracked saws shall be removed from service.	9.3.2.1 Cracked saw blades shall be removed from service and shall not be used until they have been inspected and repaired by a skilled sawsmith. If a skilled sawsmith is not available, saw blades should be returned to the manufacturer for welding, slotting, or tensioning as required for safe operating speed and service.	
(8) The practice of inserting wedges between the saw disk and the collar to form what is commonly known as a "wobble saw" shall not be permitted.	9.3.2.4 The practice of inserting wedges between the saw blades and the collar to form what is commonly known as a wobble saw shall not be permitted.	
(9) Push sticks or push blocks shall be provided at the work place in the several sizes and types suitable for the work to be done.	9.3.2.5 Push sticks or push blocks shall be provided at the workplace in several sizes and types suitable for the work to be done.	
(10) Twists or kinks in bandsaws and band resaws shall be promptly removed with a hammer.	9.3.2.7 Band saw blades shall be periodically examined to avoid use of cracked blades or blades that indicate probability of breakage.	
(11) To avoid vibration, brazed joints in bandsaws and band resaws shall be the same thickness as the saw blade.	9.3.3.6 To avoid vibration, brazed joints shall be the same thickness as the saw blade.	

Present Standard	Latest ANSI Standard	Comments
1910.213	01.1-1975	
(12) The knife blade of jointers shall be so installed and adjusted that it does not protrude more than one-eighth inch beyond the cylindrical body of the head. Push sticks or push blocks shall be provided at the work place in the several sizes and types suitable for the work to be done.	9.3.4.1 The hazard of jointing pieces that are too short is excessive. Minimum length of the piece jointed should be not less than four times the width of the bed opening. Neither half of the jointer table shall be adjusted horizontally so that the clearance between the edge of the table and the revolving knives is more than 1/4 inch. The knife blade shall be so installed and adjusted that it does not protrude more than 1/8 inch beyond the cylindrical body of the head. Push sticks or push blocks shall be provided at the workplace.	(s)(12) Comments are solicited on a suggestion to modify the existing standard to incorporate the following requirements: 1. Limiting the minimum length of pieces to be jointed to not less than four times the width of the bed opening and 2. Limiting the horizontal table adjustment to not exceeding 1/4 inch from table edge to the knives.
(13) Whenever veneer slicers or rotary veneer-cutting machines have been shutdown for the purpose of inserting logs or to make adjustments, operators shall make sure that machine is clear and other workmen are not in a hazardous position before starting the machine.	No equivalent	
(14) Operators shall not ride the carriage of a veneer slicer.	No equivalent	

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
		1. Definitions appropriate for the cooperage industry will be selected from §1910.211(a) and included in §1910.214. 2. A scope shall be developed for cooperage and included in §1910.214. It has been suggested that the cooperage requirements be combined under §1910.213 (Woodworking). Comments and information are solicited to determine if the basic hazards, equipment and methods of machine safeguarding differ sufficiently to warrant a continued separation of the two sections.
(a) Heading bolt sawing machine. (1) Each heading saw shall be guarded by a hood curved to the contour of the saw. The hood shall cover the saw at least to the depth of the teeth, except for that portion actually used in making the cut. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the saw. The hood shall be made of adequate strength to resist strains incidental to reasonable operation.	8.2 Saws 8.2.1 Heading Bolt Sawing Machine 8.2.1.1 Each heading saw blade shall be guarded by a hood curved to the contour of the blade. The hood shall cover the saw at least to the depth of the teeth, except for that portion actually used in making the cut. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the blade. The hood shall be made of adequate strength to resist strains incidental to reasonable operation, adjusting and handling and to protect the the operator from flying splinters and broken saw teeth.	
(2) The balance wheel shall be covered to enclose the rim and outside portion of the wheel. Expanded metal curved to fit the contour of the wheel is recommended.	8.2.1.2 The balance wheel shall be covered to enclose the rim and outside portion of the wheel.	(a)(2) Comments information are solicited as to whether the strength of the guard for a balance wheel should be specified. Would identifying the hazards to protect against be sufficient to determine the construction criteria? What are the hazards?

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
(3) The swing carriage shall be provided with an effective device that will return the carriage automatically to a position in front of the saw. Such a device shall not depend entirely upon any rope, cord, or spring for its proper functioning. If a counterweight is used, a safety chain shall be attached to it to prevent dropping, should the bar break or the weight become disengaged. All bolts supporting the bar, weight, and chain shall be provided with cotter pins or safety effective devices. A bolt shall be put through the extreme end of the counterweight bar to prevent dropping of the weight.	8.2.1.3 The swing carriage shall be provided with an effective device that will return the carriage automatically to a position in front of the saw.	(a)(3) Comments are solicited to determine whether or not sufficient guidance and operator protection would be provided without the availability of design criteria for the use of a counterweight on the swing carriage of a head bolt sawing machine. Examples are requested of effective devices now being used to return the carriage to a position in front of the saw.
(4) A limit stop shall be provided to prevent the carriage from swinging far back and thereby exposing the unguarded portion of the saw to contact.	8.2.1.4 A limit stop shall be provided to prevent the carriage from swinging too far back and thereby exposing the unguarded portion of the blade to contact.	
No equivalent	8.2.2 Hand-Fed Flat Table-Type Heading Saw. The saw blade shall be guarded by a hood curved to the contour of the blade and mounted on the table top in such a manner as to completely cover the blade when it is not engaging the material.	8.2.2 Comments are solicited on the suggestion to expand the coverage in §1910.214 to include hand-fed flat table-type heading saw machines and the need to address a saw blade guard requirement.
(b) Bolt equalizer, stave, and heading saws (tilting table style).	8.2.3 Bolt Equalizer, Stave and Heading Saws (Tilt-Table Style)	
(1) All heading and stave bolt equalizer saws shall be guarded by hoods, curved to the contour of the saws. The hood shall cover the saw at least to the depth of the teeth, except for that portion actually used in making the cut. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the saws.	8.2.3.1 All heading and stave bolt equalizer saw blades shall be guarded by hoods, curved to the contour of the saws. The hood shall cover the blade at least to the depth of the teeth, except for that portion actually used in making the cut. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the blades.	(b) A comment has been received that "to guard effectively" could be better described in terms of the hazards to be guarded against. Other than flying splinters and broken teeth, what are the hazards? Should a strength specification be added to the guard requirement? Note 8.2.1.1 (ANSI).

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
(2) Hoods shall be attached to each end of the tilting table and shall extend forward to cover the portion of the saws which cannot be enclosed by a stationary guard.	8.2.3.2 Hoods shall be attached to each end of the tilting table and shall extend forward to cover the portion of the blades that cannot be enclosed by a stationary guard.	
(3) A limit stop shall be provided to prevent the table from coming too far back and thereby exposing the unguarded portion of the saws to contact.	8.2.3.3 A limit stop shall be provided to prevent the table from coming too far back and thereby exposing the unguarded portion of the saw blades to contact.	
No equivalent	8.2.3.4 Hydraulically operated saws should be guarded as outlined in 8.2.3.1.	
(c) Barrel stave saws (cylindrical saws).	8.2.4 Barrel Stave Saws (Cylindrical Saws)	
(1) Each machine of this type shall have the saw and the revolving part (head) to which the saw blade is bolted enclosed with a hinged guard to prevent accidental contact, except for that part of the saw immediately adjacent to the carriage, which is the point of operation of the saw.	8.2.4.1 Each machine of this type shall have the saw blade and the revolving part (head) to which the saw blade is bolted enclosed with a hinged guard to prevent accidental contact, except for that part of the saw blade immediately adjacent to the carriage, which is the point of operation of the saw.	
(2) The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the saw. The hood shall be made of adequate strength to resist strains incidental to reasonable operation.	8.2.4.2 The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the blade. The hood shall be made of adequate strength to resist strains incidental to reasonable operation.	
(d) Hand-fed ripsaws.	8.2.5 Hand-Fed Stave and Heading Ripsaws	
(1) Each circular hand-fed ripsaw shall be guarded with a hood. The hood shall be stationary and cover the saw to a distance of approximately three-fourths inch above the stave being ripped. This will prevent the material being cut from being raised by upward centrifugal force of the saw in cases	8.2.5.1 Each circular hand-fed stave and heading ripsaw shall be provided with a hood-type guard that will cover the blade at all times when the saw is not in use. 8.2.5.2 When the saw is in use, the hood-type guard shall enclose that portion of the blade above the the table and that portion of the blade above the material by adjusting	(d)(1) Comments are requested on the suggestion to modify the coverage in (d)(1) to include guarding the ripsaw blade when not in use as in ANSI standard 01.1-1975 (8.2.5.1). Will the use of a self adjusting hood-type guard as opposed to a stationary guard expose operators to the hazard of material

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
of pinching or binding before the stave reaches the splitter. The hood shall provide inside clearance between the top edge of saw and guard to allow an accidental blow to strike it to the table and not engage the teeth with the guard. The hood shall be constructed of heavy material, preferably metal. That portion of the saw remaining below the table shall be completely enclosed in an exhaust hood.	automatically to the thickness of the material being cut. 8.2.5.3 Hood-type guards shall be so designed and constructed as to resist blows and strains incidental to reasonable operation, adjusting, and handling to protect the operator from flying splinters and broken saw teeth.	being raised by the upward centrifugal force of the saw blade in cases of pinching and binding? The current ANSI standard does not address the hazards which are prevented by enclosing that portion of the saw blade below the table with an exhaust enclosure. What is the hazard exposure to employees without the enclosure? Is metal preferable? Why? What criteria would govern substitution of materials? Should strength requirements be given?
(2) Spreader requirements for this equipment are contained in Section 1910.213(c)(2).	8.2.5.4 Each hand-fed circular stave and heading ripsaw shall be equipped with a spreader.	
No equivalent	8.2.5.6 Radial Saws. The upper hood shall completely enclose that portion of the blade down to a point that will include the end of the saw arbor. The upper hood shall be constructed in a manner that will protect the operator from flying splinters and broken saw teeth, and will deflect sawdust away from the operator. The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of stock and remain in contact with the stock being cut.	8.2.6 The current ANSI standard incorporates a requirement for upper hood and lower blade guards to protect against operations hazards for a radial saw. How does the equipment differ from that used in woodworking? Should the same criteria apply for a 3/8 inch gullet exposure to lower guard, for the warning label? Will the use of a self adjusting lower blade guard restrict any operations? What are the operations?
(e) Self-feed stave and heading equalizer saws.	8.2.7 Self-Feed Stave and Heading Equalizer Saws	
(1) Self-feed equalizer saws shall be guarded with a hood guard which will cover the top	8.2.7.1 Self-feed equalizer saw blades shall be guarded with a hood guard that will cover the top and sides of the saw blades. The hood shall adjust itself automatically to the	

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
and sides of the saws. The hood should adjust itself automatically to the thickness of, and remain in contact with, the material being cut.	thickness of, and remain in contact with, the material being cut.	
No equivalent	8.2.7.2 The hood shall be constructed of material sufficiently heavy to serve as a hold-down device while the stave is passing between the blades.	8.2.7.2 Comments are solicited to determine whether or not a weight requirement for the hood guard can substitute for a holddown device and be as effective in reducing the hazard of a stave being thrown from a machine. What criteria could better define the words "sufficiently heavy"?
(2) The portion of the saw blade extending beneath the mandrel shall be enclosed in an exhaust hood and be easily accessible for changing saws.	8.2.7.3 The portion of the saw blade extending beneath the arbor shall be enclosed in an exhaust hood and be easily accessible for changing blades.	
(f) Stave and heading planers (single and double heads).	8.3 Stave and Heading Plahers (Single and Double Heads)	
(1) The exhaust hood, or other guards, if no exhaust system is required, shall be so arranged and maintained as to guard effectively all cutting heads and knives of single and double planers.	8.3.1 Guarding of Cutterheads. The exhaust hood, or other guards if no exhaust system is required, shall be so arranged and maintained as to guard effectively against accidental contact with all cutting heads and knives.	
(2) Feed rolls, except for such portion as may be necessary to admit stock, shall be completely enclosed.	8.3.2 Point of Operation 8.3.2.1 Feed rolls, except for such portion as may be necessary to admit stock, shall be completely enclosed. Sectional feed rolls shall be provided for heading planers. Effective antikickback devices should be provided for all heading planers, regardless of the type of feed rolls.	(f)(2) Comments are solicited to determine what hazards can be eliminated by using sectional as opposed to another type feed roll for heading planers. What are the types and availability of antikickback devices for use on the machine?

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
(3) Presure bars or holddown arrangements shall be properly adjusted to assure correct pressure and clearance at all times.	8.3.2.2 Pressure bars or hold-down arrangements shall be provided to assure correct pressure and clearance at all times.	
(g) Stave jointing machines (wheel).		
(1) Stave jointer wheels shall be covered on both sides with a removable metal hood connected to the exhaust system, except for that portion where the stock is applied to the knives.	8.4.1 Stave jointer wheels shall be covered on both sides with a removable metal hood connected to the exhaust system, except for that portion where the stock is applied to the stock is applied to the knives.	(g)(1) Comments and information are solicited on the hazard exposure requiring the need to specify the use of metal guard material for stave jointer wheels. Should other types of materials be permitted and if so what should the strength criteria be?
(2) A limit stop should be installed on the frame to prevent any part of the carriage from coming in contact with any moving part of the wheel.	8.4.2 A limit stop shall be provided to prevent any part of the carriage from coming in contact with any moving part of the wheel.	
(3) The equipment described in subparagraphs (1) and (2) of this paragraph include double independent stave jointer wheels, double jointer stave wheels, single jointer stave wheels, and all kinds of keg stave jointer wheels.	8.4 Stave Jointing Wheels. Requirements for guarding double independent stave jointer wheels, double jointer stave wheels, single jointer stave wheels, and all kinds of keg stave jointer wheels are as given in 8.4.1 and 8.4.2.	
(h) Heading jointer and doweler machine (wheel).	8.5 Guarding of Heading Jointer and Doweler Machine (Wheel)	
(1) Each heading jointer shall be equipped with a removable guard covering the upper half of the wheel, except for that portion where the stock is applied to the knives.	8.5.1 Each heading jointer shall be equipped with a removable guard covering the upper half of the wheel, except for that portion where the stock is applied to the knives.	
(2) The lower portion of the wheel shall be guarded with sheet metal or expanded metal to prevent accidental contact with the knives.	8.5.2 The lower portion of the wheel shall be guarded to prevent accidental contact with the knives.	(h)(2) Comments and suggestions are solicited as to whether OSHA should permit the use of guards other than those made of metal. What types of materials should be permitted?

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
		What additional hazards can be anticipated with substitutions for the current metal requirement? Should a strength specification be given, and if so what should it be?
No equivalent	8.5.3 Dowel bit pulleys and belts shall be guarded.	
(i) Heading rounder. The cutter head shall be enclosed in a hood attached to the exhaust system, arranged and maintained in such a manner as to guard effectively the entire cutting mechanism, except for that portion of the cutting head where the stock is applied.	8.6 Guarding of Heading Rounder. The cutterhead shall be enclosed in a hood attached to the exhaust system, except for that portion of the cutting head where the stock is applied.	
(j) Power windlass machine. Windlass machines having counterweight shall operate with the weights in a stationary casing. On all machines having a friction gear, the gear shall be properly guarded.	8.7 Guarding of Power Windlass Machine. Windlass machines having counterweight shall operate with the weights in a stationary casing. On all machines having a friction gear, the gear shall be properly guarded.	
(k) Crozing machine (stationary heads). Feed chains and sprockets shall be completely enclosed. This includes all types of barrel, keg, bucket, tub, and individual stave crozers, chamfering, crozing, and doweling machines.	8.8 Crozing Machines (Stationary Heads). Requirements for guarding all types of barrel, keg, bucket, tub, and individual stave crozers, chamfering, and doweling machines are as follows: Feed chains and sprockets shall be completely enclosed.	
(l) Heading-up machine. The outside portion and teeth of both drive gears for the racks shall be completely guarded. This includes all types of heading-up machines.	8.9 Guarding of Gear-Driven Heading-up Machines. Drives gears for the racks shall be completely guarded.	

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
(m) Head charring machine. All tripping mechanisms shall be completely guarded.	8.10 Guarding of Head-Charring Machine. All tripping mechanisms shall be completely guarded.	
(n) Bilge truss hoop ring removing machine.	8.11 Bilge- and Head-Truss Hoop Ring-Removing Machines. Horizontal and upright-type machines shall be guarded as in 8.11.1 and 8.11.2.	
(1) Both eccentric cams and gear works on horizontal machines shall be guarded.	8.11.1 Both eccentric cams and gear works on horizontal machines shall be guarded.	
(2) Combined flywheel and gear shall be completely enclosed by a guard. This includes the horizontal and upright-type machines.	8.11.2 Combined flywheel and gear shall be completely enclosed.	
(o) Hoop elevators and conveyors. Lower sprockets and chains shall be guarded by complete enclosure to a height of at least 7 feet.	8.12 Guarding of Hoop Elevators and Conveyors. Lower sprockets and chains shall be guarded by complete enclosure to a height of at least 7 feet.	
(p) Barrel sanding machine. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs onto a pulley. This guard may be a part of the exhaust system. The unused run of the sanding belt shall be enclosed.	8.13 Guarding of Barrel-Sanding Machine. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs onto a pully. This guard may be a part of the exhaust system. The unused run of the sanding belt shall be enclosed.	
(q) Hoop drivers and trussers. (1) All friction pulleys shall be enclosed by a guard. A hinged gate should be provided for that portion of the guard covering adjustments to the friction blocks.	8.14 Hoop Drivers and Trussers. Requirements for guarding keg hoops, tin barrel hoops, truss hoops, and both screw and rack and pinion-type hoop drivers are as follows: All friction pulleys shall be enclosed by a guard. A hinged gate should be provided for that portion of the guard covering adjustments to the friction blocks.	

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
(2) The foregoing recommendation covers drivers for keg hoops, tin barrel hoops, truss hoops, and both screw and rack and pinion-type hoop drivers.		
(r) Head sanding machine.	8.15.2 Machine Sanders. The exhaust hood of automatic horizontal disk-head sanders shall be so arranged as to enclose each disk, except for that portion necessary for the application of the heads being finished.	
The exhaust hood of automatic horizontal disk head sanders shall be so arranged as to enclose each disk, except for that portion necessary for the application of the barrel being finished.		
(s) Hand jointer.	8.16 Hand Jointer. All horizontal hand-fed jointers shall comply with 6.3.	
All hand-fed jointers shall be guarded in accordance with the provisions of §1910.213(j).		
(t) Hoop punching and coiling machine.	8.17 Hoop-Punching and Coiling Machine. Guarding of horizontal and upright hoop-punching machines and of coiling machines shall be as follows: miter gears, spur gears, drive pulley, and pulley for coiling attachment shall be guarded.	
Miter gears, spur gears, drive pulley, and pulley for coiling attachment shall be guarded. This includes the horizontal hoop punching and coiling machine as well as the upright hoop punching machine.		
(u) Hoop riveting machine.	8.18 Hoop-Riveting Machine. Guarding of automatic, single-, and double-hoop riveters shall be as follows: The balance and drive wheels shall be effectively guarded.	
The balance and drive wheels shall be effectively guarded. This includes automatic single, and double hoop riveters.		
No equivalent	8.20 Bung-Boring Machine. The reamer shall completely enclosed when not engaging the wood.	8.20 Comments are requested on the suggestion to expand the coverage in §1910.214 to include a bung-boring machine.
No equivalent	8.21 Hogs 8.21.1 Hog mills shall be so designed and arranged that from no position on the rim of	8.21 Comments are requested on the suggestion to expand coverage in §1910.214 to address the hazards for hog mills as in the

Present Standard	Latest ANSI Standard	Comments
1910.214	01.1-1975	
No equivalent	the chute shall the distance to the cutter knives be less than 40 inches. 8.21.2 Hog feed chutes shall be provided with suitable and approved baffles, which shall minimize material being thrown from the mill.	ANSI standard 01.1-1975 (8.21.1-8.21.3).
No equivalent	8.21.3 Employees feeding hog mills shall be provided with safety belts and lifelines, unless guardes.	
(v) Hoop flaring and expanding machine. Gearing shall be completely enclosed.	8.19 Guarding of Hoop Flaring and Expanding machine. Gearing shall be completely enclosed.	
(w) Inspection and maintenance of cooperage machinery. For inspection and maintenance of cooperage machinery see §1910.213(s).	See 9.1 for inspection and maintenance.	(w) Same comments solicited as in 1910.213(s)

Present Standard	Latest ANSI Standard	Comments
1910.215 ABRASIVE WHEEL MACHINERY	The American National Standards Institute (ANSI) has not changed the original source standard ANSI B7.1-1970 "Safety Code for the Use, Care, and Protection of abrasive wheels" from which the current 1910.215 is derived. Therefore, the ANSI standard is not reprinted here.	The appropriate definitions for this section are found in section 1910.211(b). Comments are requested regarding the suitability and adequacy of the following suggested scope statement for this standard. This standard provides for proper equipment and safe practices to be used in grinding operations where material is removed from workpieces constructed of materials such as metal, masonry, concrete, glass, ceramics, plastics, and rubber by using a revolving abrasive wheel. Grinding operations using sandstone, pulpstone, and abrasive coated discs of metal, wood, cloth, or paper are not included. Changes proposed in Tentative ANSI draft B7.1-1976 prepared by the Technical Committee for B7 (Tentative ANSI B7.1) are referred to at various points.

Present Standard	Latest ANSI Standard	Comments
1910.215		
(a) General requirements.		
(1) Machine guarding. Abrasive wheels shall be used only on machines provided with safety guards as defined in the following paragraphs of this section, except:		(a)(1) Tentative ANSI B7.1 proposes that safety guards should not be required with notched, segmented or continuous rim metal centered diamond lapidary wheels used with coolant deflectors when operated at speeds up to 3500 SFPM and Type 1 reinforced wheels not more than 2 inches in diameter and 1/4 inch in thickness. Does the elimination of these guards create significant employee hazards? Are any other safety measures required if these practices are permitted?
(i) Wheels used for internal work while within the work being ground;		
(ii) Mounted wheels, used in portable operations, 2 inches and smaller in diameter; and		
(iii) Types 16, 17, 18, 18R, and 19 cones, plugs, and threaded hole pot balls where the work offers protection.		
(2) Guard design. The safety guard shall cover the spindle end, nut, and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard, except:		

Present Standard	Latest ANSI Standard	Comments
1910.215		
(i) Safety guards on all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and outer flange are exposed; and where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted; and		
(ii) The spindle end, nut, and outer flange may be exposed on machines designed as portable saws.		(a)(2)(ii) The Tentative ANSI B7.1 proposes that the spindle end, nut and outer flange may be exposed on masonry and concrete saws. Does this exception create any hazards to employee safety? Should any other machines also be excepted?
		The Tentative ANSI B7.1 proposes that the spindle end, nut and outer flange may be exposed at the bottom of the stroke on cutting-off machines equipped with stationary guards. Does the elimination of a safety guard covering the spindle end, nut and outer flange on these machines create any hazard to employees?
(3) Flanges. Grinding machines shall be equipped with flanges in accordance with paragraph (c) of this section.		

Present Standard	Latest ANSI Standard	Comments
1910.215 (4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.		(a)(4) Comments are requested on the American Foundrymen's Society petition to OSHA to delete the 1/8 inch maximum opening requirement and to permit larger openings proportional to the size of the piece being ground. Should OSHA permit light freehand grinding without the use of a workrest as proposed in a variance request submitted by Mohawk Tools, Inc. Is the additional degree of hazard acceptable? How can this practice be limited to only those cases where it might be necessary to not use work rests? Are any other safety measures required if this practice is permitted? Tentative ANSI B7.1 proposes that work rests should not be required when grinding large pieces supported by overhead hoists. Does the absence of a work rest in this situation create a greater degree of hazard to employee safety? Tentative ANSI B7.1 proposes that adjustment of the work rest while the wheel is rotating be permitted with variable speed machines having control linkages attached to the work rest. Would permitting the adjustment of work rests in this situation create a hazard to employee safety?

Present Standard	Latest ANSI Standard	Comments
1910.215 (5) Excluded machinery. Natural sandstone wheels and metal, wooden, cloth, or paper discs, having a layer of abrasive on the surface are not covered by this section. (b) Guarding of abrasive wheel machinery. (1) Cup wheels. Cup wheels (Types 6 and 11) shall be protected by: (i) Safety guards as specified in subparagraphs (1) through (10) of this paragraph; (ii) Band type guards as specified in subparagraph (11) of this paragraph; and (iii) Special "Revolving Cup Guards" which mount behind the wheel and turn with it. They shall be made of steel or shall enclose the wheel sides upward from the back for one-third of the wheel thickness. The mounting features shall conform with all requirements of this section. It is necessary to maintain clearance between the wheel side and the guard. This clearance shall not exceed one-sixteenth inch.		(b)(1)(iii) Should revolving cup guards be banned after a specified period as suggested by ANSI B7.1 and, if so, why?

Present Standard	Latest ANSI Standard	Comments
1910.215 (2) Guard exposure angles. The maximum exposure angles specified in subparagraphs (3) through (8) of this paragraph shall not be exceeded. Visors or other accessory equipment shall be included as a part of the guard when measuring the guard opening, unless such equipment has strength equal to that of the guard. (3) Bench and floor stands. The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed 90° or one-fourth of the periphery. This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See Figures O-6 and O-7 and subparagraph (9) of this paragraph.) Wherever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125°. (See Figures O-8 and O-9.) (4) Cylindrical grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on cylindrical grinding machines shall not exceed 180°. This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See Figures O-10 and O-11 and subparagraph (9) of this paragraph.)		(b)(2) Correspondence received by OSHA indicates that an explanantion should be included stating that the exposure angle of a guard is measured from the center of the spindle. Diagrams in Tentative ANSI B7.1 have been changed to better reflect this.

Present Standard	Latest ANSI Standard	Comments
1910.215		
(5) Surface grinders and cutting-off machines. The maximum angular exposure for safety guards used on cutting-off machines and on surface grinding machines which employ the wheel periphery shall not exceed 150°. This exposure shall begin at a point not less than 15° below the horizontal plane of the wheel spindle. (See Figures O-12 and O-13.)		
(6) Swing frame grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as swing frame grinding machines shall not exceed 180°, and the top half of the wheel shall be enclosed at all times. (See Figures O-14 and O-15.)		
(7) Automatic snagging machines. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on grinders known as automatic snagging machines shall not exceed 180° and the top half of the wheel shall be enclosed at all times. (See Figures O-14 and O-15.)		
(8) Top grinding. Where the work is applied to the wheel above the horizontal centerline, the exposure of the grinding wheel periphery shall be as small as possible and shall not exceed 60°. (See Figures O-16 and O-17.)		

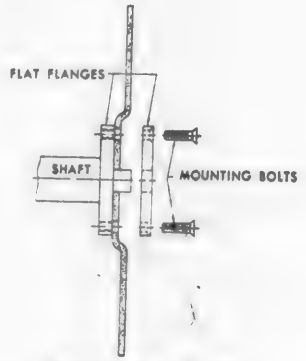
Present Standard	Latest ANSI Standard	Comments
1910.215		
(9) Exposure adjustment. Safety guards of the types described in subparagraphs (3) and (4) of this paragraph, where the operator stands in front of the opening, shall be constructed so that the peripheral protecting member can be adjusted to the constantly decreasing diameter of the wheel. The maximum angular exposure above the horizontal plane of the wheel spindle as specified in subparagraphs (3) and (4) of this paragraph shall never be exceeded, and the distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top shall never exceed one-fourth inch. (See Figures O-18, O-19, O-20, O-21, O-22, and O-23.)		(b)(9) The Tentative ANSI B7.1 proposes that an adjustable tongue not be required on bench grinders with wheels 5 inches in diameter or less operating at speeds less than 5000 SFPM and powered by machines not greater than 1/10 horsepower. Does the elimination of an adjustable tongue on these bench grinders create any hazards to employee safety?
(10) Material requirements and minimum dimensions. (i) See Figures O-36 and O-37 and Table O-9 for minimum basic thickness of peripheral and side members for various types of safety guards and classes of service. (ii) If operating speed does not exceed 8,000 surface feet per minute, cast iron safety guards, malleable iron guards or other guards as described in subparagraph (10)(iii) of this paragraph shall be used.		(b)(10) Should safety guards constructed of other materials which provide the equivalent strength, impact resistance, and rigidity as those listed here be permitted? Are there any materials which should not be permitted?

Present Standard	Latest ANSI Standard	Comments
1910.215 (iii) Cast steel, or structural steel, safety guards as specified in Figures O-36 and O-37 and Table O-9 shall be used where operating speeds of wheels are faster than 8,000 surface feet per minute up to a maximum of 16,000 surface feet per minute. (iv) For cutting-off wheels 16 inches diameter and smaller and where speed does not exceed 16,000 surface feet per minute, cast iron or malleable iron safety guards as specified in Figures O-36 and O-37, and in Table O-9 shall be used. (v) For cutting-off wheels larger than 16 inches diameter and where speed does not exceed 14,200 surface feet per minute, safety guards as specified in Figures O-27 and)-28, and in Table O-1 shall be used. (vi) For thred grinding wheels not exceeding one inch in thickness cast iron or malleable iron safety guards as specified in Figures O-36 and O-37, and in Table O-9 shall be used. (11) Band type guards--general specifications. Band type guards shall conform to the following general specifications:		(b)(11) Should access doors be permitted on band guards used on segment wheels as proposed in Tentative ANSI B7.1? If so, are rules necessary to insure that the access door does not present a hazard to employees?

Present Standard	Latest ANSI Standard	Comments
1910.215 (i) The bands shall be of steel plate or other material of equal or greater strength. They shall be continuous, the ends being either riveted, bolted, or welded together in such a manner as to leave the inside free from projections. (ii) The inside diameter of the band shall not be more than 1 inch larger than the outside diameter of the wheel, and shall be mounted as nearly concentric with the wheel as practicable. (iii) The band shall be of sufficient width and its position kept so adjusted that at no time will the wheel protrude beyond the edge of the band a distance greater than that indicated in Figure O-29 and in Table O-2 or the wall thickness (W), whichever is smaller. (12) Guard design specifications. Abrasive wheel machinery guards shall meet the design specifications of the American National Standard Safety Code for the Use, Care, and Protection of Abrasive Wheels, ANSI B7.1-1970. This requirement shall not apply to natural sandstone wheels or metal, wooden, cloth, or paper discs, having a layer of abrasive on the surface.		

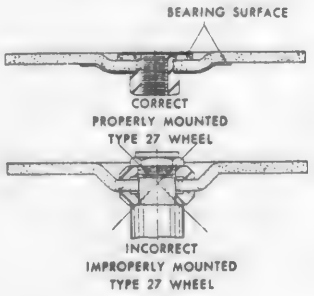
Present Standard	Latest ANSI Standard	Comments
1910.215		
(c) Flanges. (1) General requirements. All abrasive wheels shall be mounted between flanges which shall not be less than one-third the diameter of the wheel. (i) Exceptions: (a) Mounted wheels. (b) Portable wheels with threaded inserts or projecting studs. (c) Abrasive discs (inserted nut, inserted washer and projecting stud type). (d) Plate mounted wheels. (e) Cylinders, cup, or segmental wheels that are mounted in chucks. (f) Types 27 and 28 wheels. (g) Certain internal wheels. (h) Modified types 6 and 11 wheels (terrazzo).		(c)(1)(i)(b) Should this be clarified by substituting "Portable cup, cone, or plug wheels" for "Portable wheels?" (c)(1)(i)(g) The Tentative ANSI B7.1 limits the exception of internal wheels to those which are less than 2 inches in diameter. Comments are solicited on the appropriateness of this exception.

Present Standard	Latest ANSI Standard	Comments
1910.215		
(i) Cutting-off wheels, Types 1 and 27A (see subdivisions (ii) and (iii) of this subparagraph).		(c)(1)(i)(i) The Tentative ANSI B7.1 proposes that reinforced abrasive or steel centered diamond masonry cut-off wheels 18 inches and 20 inches in diameter be equipped with flanges not less than 4 inches in diameter and that steel centered diamond concrete cut-off wheels 20 inches in diameter and larger be equipped with flanges not less than 1/6 the wheel diameter. Information is solicited regarding experiences with such small flanges.
(ii) Type 1 cutting-off wheels are to be mounted between properly relieved flanges which have matching bearing surfaces. Such flanges shall be at least one-fourth the wheel diameter.		
(iii) Type 27A cutting-off wheels are designed to be mounted by means of flat, not relieved, flanges having matching bearing surfaces and which may be less than one-third but shall not be less than one-fourth the wheel diameter. (See Figure O-24 for one such type of mounting.)		

Present Standard	Latest ANSI Standard	Comments
1910.215  **FIGURE NO. O-24** *The Type 27A Wheel is mounted between flat non-relieved flanges of equal bearing surfaces.* (iv) There are three general types of flanges: (a) straight relieved flanges (see Figure O-32); (b) straight unrelieved flanges (see Figure O-30); (c) adaptor flanges (see Figures O-33 and O-34);		

Present Standard	Latest ANSI Standard	Comments
1910.215		
(v) Regardless of flange type used, the wheel shall always be guarded. Blotters shall be used in accordance with subparagraph (6) of this paragraph. (2) Design and material. (i) Flanges shall be of such design as to satisfactorily transmit the driving torque from the spindle to the grinding wheel. (ii) Flanges may be made of steel, cast iron, or other material of equal or greater strength and rigidity. (iii) Flanges shall be designed with respect to rigidity so that when tightened, the radial width of bearing surface of contact on the wheel is maintained. (See Table O-6 and Figure O-32.) (3) Finish and balance. Flanges shall be dimensionally accurate and in good balance. There shall be no rough surfaces or sharp edges. (4) Uniformity of diameter. (i) Both flanges, of any type, between which a wheel is mounted, shall be of the same diameter and have equal bearing surface. Exceptions are set forth in the remaining subdivisions of this subparagraph.		

Present Standard	Latest ANSI Standard	Comments
1910.215 (11) Type 27 and Type 28 wheels, because of their shape and usage, require specially designed adaptors. The back flange shall extend beyond the central hub or raised portion and contact the wheel to counteract the side pressure on the wheel in use. The adaptor nut which is less than the minimum one-third diameter of wheel fits in the depressed side of wheel to prevent interference in side grinding and serves to drive the wheel by its clamping force against the depressed portion of the back flange. The variance in flange diameters, the adaptor nut being less than one-third wheel diameter, and the use of side pressure in wheel operation limits the use to reinforced organic bonded wheels. Mounts which are affixed to the wheel by the manufacturer shall not be reused. Type 27 and Type 28 wheels shall be used only with a safety guard located between wheel and operator during use. (See Figure O-24-A.)		

Present Standard	Latest ANSI Standard	Comments
1910.215 **FIGURE NO. 0-24-A**  *Types 27 and 28 wheels, because of their shape, require specially designed adaptors.* (iii) Modified Types 6 and 11 wheels (terrazzo) with tapered K dimension.		(c)(4)(iv) The Tentative ANSI B7.1 proposes that another exception be internal wheels less than 2 inches in diameter. Comments are solicited on whether the adoption of this exception would affect employee safety.

Present Standard	Latest ANSI Standard	Comments
1910.215 (5) Recess and undercut. (i) Straight relieved flanges made according to Table O-6 and Figure O-32 shall be recessed at least one-sixteenth inch on the side next to the wheel for a distance as specified in Table O-6. (ii) Straight flanges of the adaptor or sleeve type (Table O-7 and Figures O-33 and O-34) shall be undercut so that there will be no bearing on the sides of the wheel within one-eighth inch of the arbor hole. (6) Blotters. (i) Blotters (compressible washers) shall always be used between flanges and abrasive wheel surfaces to insure uniform distribution of flange pressure. (See paragraph (d)(5) of this section.) (ii) Exception: (a) Mounted wheels. (b) Abrasive discs (inserted nut, inserted washer, and projecting stud type). (c) Plate mounted wheels. (d) Cylinders, cups, or segmental wheels that are mounted in chucks.		

Present Standard	Latest ANSI Standard	Comments
1910.215		
(e) Types 27 and 28 wheels.		
(f) Certain Type 1 and Type 27A cutting-off wheels.		
(g) Certain internal wheels.		(c)(6)(ii)(g) Should this be restricted to internal wheels less than 2 inches in diameter as proposed in tentative ANSI B7.1?
(h) Type 4 tapered wheels.		(c)(6)(ii)(h) Should Type 4 wheels be deleted from the exceptions and do they require blotters as proposed in tentative ANSI B7.1?
(i) Diamond wheels, except certain vitrified diamond wheels.		(c)(6)(ii)(i) Comments are requested on changing this to read diamond and cubic boron nitride wheels as proposed in tentative ANSI B7.1.
(j) Modified Types 6 and 11 wheel (terrazzo)--blotters applied flat side of wheel only.		
(7) Driving flange. The driving flange shall be securely fastened to the spindle and the bearing surface shall run true. When more than one wheel is mounted between a single set of flanges, wheels may be cemented together or separated by specially designed spacers. Spacers shall be equal in diameter to the mounting flanges and have equal bearing surfaces. (See paragraph (d)(6) of this section.)		(c)(7) The Tentative ANSI B7.1 proposes that driving flanges on bench grinders with wheels 8 inches or less in diameter and powered by machines not greater than 3/4 horsepower do not have to be fastened to the spindle.

Present Standard	Latest ANSI Standard	Comments
1910.215 (8) Dimensions. (i) Tables O-4 and O-6 and Figures O-30 and O-32 show minimum dimensions for straight relieved and unrelieved flanges for use with wheels with small holes that fit directly on the machine spindle. Dimensions of such flanges shall never be less than indicated and should be greater where practicable. (ii) Table O-5, and Table O-7 and Figures O-31, O-33, O-34 show minimum dimensions for straight adaptor figures for use with wheels having holes larger than the spindle. Dimensions of such adaptor flanges shall never be less than indicated and should be greater where practicable. (iii) Table O-8 and Figure O-35 show minimum dimensions for straight flanges that are an integral part of wheel sleeves which are frequently used on precision grinding machines. Dimensions of such flanges shall never be less than indicated and should be greater where practicable.		(c)(8) There are questions as to whether or not sections such as this one and the detailed figures and tables associated with it should be retained. Is this information useful and does it significantly enhance employee safety? Is the information presented here too restrictive?

Present Standard	Latest ANSI Standard	Comments
1910.215		
(9) Repairs and maintenance. All flanges shall be maintained in good condition. When the bearing surfaces become worn, warped, sprung, or damaged they should be trued or refaced. When refacing or truing, care shall be exercised to make sure that proper relief and rigidity is maintained as specified in subparagraphs (2) and (5) of this paragraph and they shall be replaced when they do not conform to these subparagraphs and Table O-4, Figure O-30-, Table O-5, Figure O-31, Table O-6, Figure O-32, and Table O-8, Figure O-35.		
Failure to observe these rules might cause excessive flange pressure around the hole of the wheel. This is specially true of wheel-sleeve or adaptor flanges.		
(d) Mounting.		
(1) Inspection. Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test) to make sure they have not been damaged in transit, storage, or otherwise. The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel. Wheels should be taped gently with a light nonmetallic implement, such as the handle of a screwdriver for light wheels, or a wooden mallet for heavier wheels. If they sound cracked (dead), they shall not be used. This is known as the "Ring Test."		(d)(1) The American Foundrymen's Society has petitioned OSHA to permit alternate test methods which are at least as effective as the "ring test." The Society contends that a "vibration test" is one test which is at least as effective. Data regarding the effectiveness of the "vibration test" and any other test method deemed effective is requested.

Present Standard	Latest ANSI Standard	Comments
1910.215		
(i) Wheels must be dry and free from sawdust when applying the ring test, otherwise the sound will be deadened. It should also be noted that organic bonded wheels do not emit the same clear metallic ring as do vitrified and silicate wheels. (ii) "Tap" wheels about 45° each side of the vertical centerline and about 1 or 2 inches from the periphery as indicated by the spots in Figure O-25 and Figure O-26. Then rotate the wheel 45° and repeat the test. A sound and undamaged wheel will give a clear metallic tone. If cracked, there will be a dead sound and not a clear "ring." (2) Arbor size. Grinding wheels shall fit freely on the spindle and remain free under all grinding conditions. A controlled clearance between the wheel hole and the machine spindle (or wheel sleeves or adaptors) is essential to avoid excessive pressure from mounting and spindle expansion. To accomplish this, the machine spindle shall be made to nominal (standard) size plus zero minus .002 inch,		(d)(1) Are employees subjected to any significant hazards if wheels 4 inches in diameter and less, plugs and cones, mounted wheels, segments, plate-mounted wheels and inserted nut and projected stud disc wheels are not tested for cracks?

Present Standard	Latest ANSI Standard	Comments
1910.215		
and the wheel hole shall be made suitably oversize to assure safety clearance under the conditions of operating heat and pressure. (3) Surface condition. All contact surfaces wheels, blotters and flanges shall be flat and free of foreign matter. (4) Bushing. When a bushing is used in the wheel hole it shall not exceed the width of the wheel and shall not contact the flanges. (5) Blotters. When blotters or flange facings of compressible material are required, they shall cover entire contact area of wheel flanges. Highly compressible material such as blotting paper as normally used should not exceed .025 inch in thickness. If material of lower compressibility is used, greater thickness may be necessary. Blotters need not be used with the following types of wheels: (i) Mounted wheels. (ii) Abrasive discs (inserted nut, inserted washer, and projecting-stud type). (iii) Plate mounted wheels. (iv) Cylinders, cups, or segmental wheels that are mounted in chucks.		

Present Standard	Latest ANSI Standard	Comments
1910.215		
(v) Types 27 and 28 wheels.		
(vi) Certain Type 1 and Type 27A cutting-off wheels.		
(vii) Certain internal wheels.		
(viii) Type 4 tapered wheels.		
(ix) Diamond wheels, except certain vitrified diamond wheels.		
		(d)(5)(x) Since modified Type 6 and Type 11 terrazzo wheels require blotters only on the flat side of the wheel, should this be listed as exception as proposed in Tentative ANSI B7.1?
(6) Multiple wheel mounting. When more than one wheel is mounted between a single set of flanges, wheels may be cemented together or separated by specially designed spacers. Spacers shall be equal in diameter to the mounting flanges and have equal bearing surfaces. When mounting wheels which have not been cemented together, or ones which do not utilize separating spacers, care must be exercised to use wheels specially manufactured for that purpose.		
(7) Replacing safety guard. After mounting a wheel, care should be taken to see that the safety guard is properly positioned before starting the wheel.		

Present Standard	Latest ANSI Standard	Comments
1910.215		

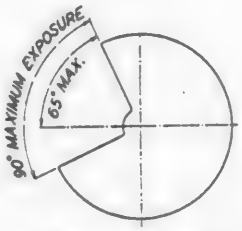


FIGURE NO. 0-6

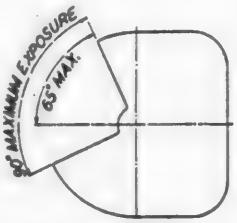


FIGURE NO. 0-7

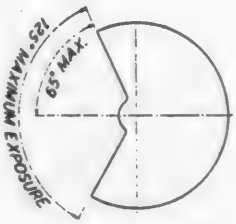


FIGURE NO. 0-8

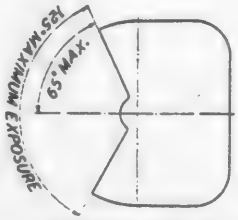
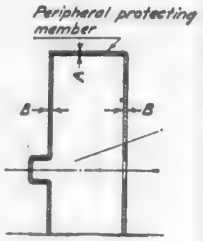


FIGURE NO. 0-9

Present Standard	Latest ANSI Standard	Comments
1910.215		



Section X-X

FIGURE NO. 0-27

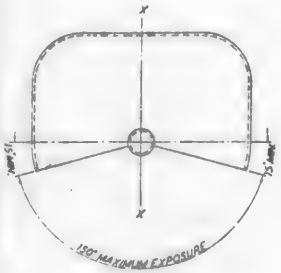
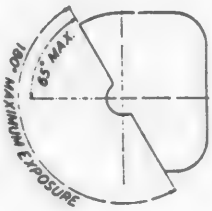


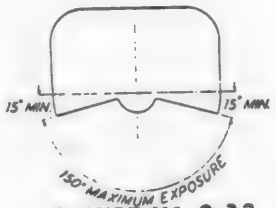
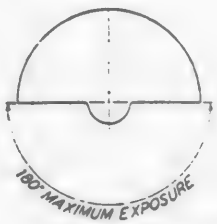
FIGURE NO. 0-28

Present Standard	Latest ANSI Standard	Comments
1910.215		
FIGURE NO. 0-10		
 FIGURE NO. 0-11		

Present Standard	Latest ANSI Standard	Comments
1910.215		

TABLE O–1—MINIMUM BASIC THICKNESS FOR PERIPHERAL AND SIDE MEMBERS FOR SAFETY GUARDS USED WITH CUTTING-OFF WHEELS

Material used in construction of guard	Maximum thickness of cutting off wheel	Speed not to exceed	Cutting off wheel diameters									
			6 to 11 inches		Over 11 to 20 inches		Over 20 to 30 inches		Over 30 to 48 inches		Over 48 to 72 inches	
			A	B	A	B	A	B	A	B	A	B
Structural steel (min. tensile strength 60,000 p.s.i.)	½ inch or less...	14,200 SFPM....	1/16	1/16	3/32	3/32	1/8	1/8	3/16	3/16	1/4	1/4
	½ inch or less...	16,000 SFPM....	3/32	1/8	1/8	1/8	3/16	1/8	1/4	3/16	5/16	1/4

Present Standard	Latest ANSI Standard	Comments
1910.215		
FIGURE NO. 0-12		
 FIGURE NO. 0-13		
 FIGURE NO. 0-14		

Present Standard	Latest ANSI Standard	Comments
1910.215		

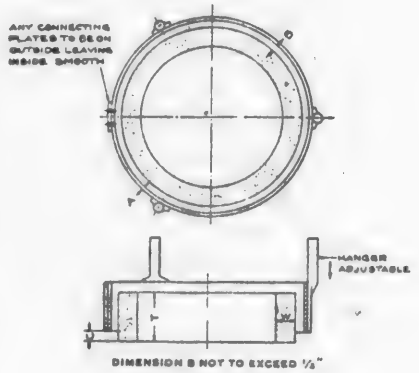


FIGURE NO. O-29

STANDARDS AND INTERPRETATIONS

TABLE O-2—EXPOSURE VERSUS WHEEL THICKNESS

Overall thickness of wheel (T) (inches)	*Maximum exposure of wheel (C) (inches)*
½	¼
1	½
2	¾
3	1
4	1½
5 and over	2

Present Standard	Latest ANSI Standard	Comments
1910.215		

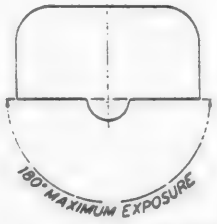


FIGURE NO. 0-15

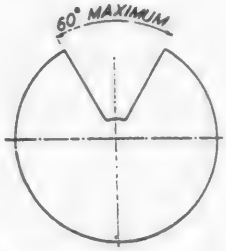


FIGURE NO. 0-16

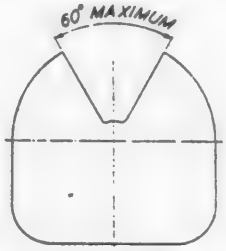


FIGURE NO. 0-17

1910.215

Present Standard

TABLE O-3—GUIDE FOR CONSTRUCTION OF BAND TYPE GUARDS

[Maximum Wheel Speed 7,000 SFPM]

Minimum material specifications	Diameter of wheel	Minimum thickness of band A	Minimum diameter of rivets	Maximum distance between centers of rivets
	Inches	*Inches*	*Inches*	*Inches*
Hot rolled steel SAE 1008.....	Under 8.....	1/16	3/16	3/4
	8 to 24.....	1/8	1/4	1
	Over 24 to 30.....	1/4	3/8	1 1/4

Latest ANSI Standard

Comments

Present Standard	Latest ANSI Standard	Comments
1910.215		

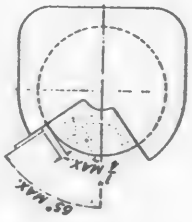


FIGURE NO. 0-19

CORRECT

Showing adjustable tongue giving required angular protection for all sizes of wheel used.

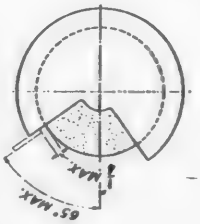


FIGURE NO. 0-18

FIGURE NO. 0-21

CORRECT

Showing movable guard with opening small enough to give required protection for smallest size wheel used.

FIGURE NO. 0-20

Present Standard	Latest ANSI Standard	Comments
1910.215		

TABLE O-4—MINIMUM DIMENSIONS FOR STRAIGHT UNRELIEVED FLANGES FOR WHEELS WITH THREADED INSERTS OR PROJECTING STUDS

A	B [1]	T
Diameter of wheel	Minimum outside diameter of flange	Minimum thickness of flange
Inches	*Inches*	*Inches*
1	⅝	1/8
2	1	1/8
3	1	3/16
4	1⅜	3/16
5	1¾	¼
6	2	⅜

[1] NOTE: Must be large enough to extend beyond the bushing. Where prong anchor or cupback bushing are used, this footnote does not apply.

FIGURE NO. O-30

Driving flange secured to spindle for use only on portable wheels with threaded inserts or projecting studs.

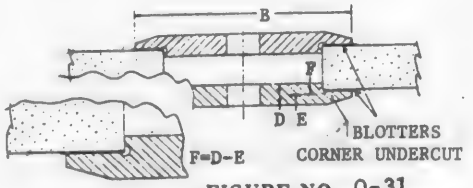


FIGURE NO. O-31

Present Standard	Latest ANSI Standard	Comments
1910.215		

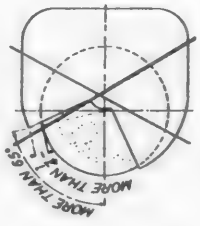


FIGURE NO. 0-23

INCORRECT

Showing movable guard with size of opening correct for full size wheel but too large for smaller wheels.

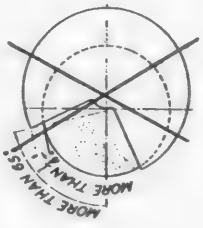


FIGURE NO. 0-22

Present Standard

1910.215

TABLE O-6—MINIMUM DIMENSIONS FOR STRAIGHT ADAPTOR FLANGE—FOR ORGANIC BONDED WHEELS OVER 1¼ INCHES THICK[1]

Wheel diameter	Wheel hole diameter	B Minimum flange diameter	D Minimum thickness of flange at bore	E Minimum thickness of flange at edge of undercut	F[1] (D-E) minimum thickness
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
12 to 14	4	6	[illegible]	[illegible]	[illegible]
	5	7			
	6	8			
Larger than 14 to 18	4	6			
	5	7			
	6	8			
	7	9			
	8	10			
Larger than 18 to 24	6	8	1		
	7	9	1		
	8	10	1		
	10	12	1		
	12	14	1		
Larger than 24 to 30	12	16	1		
Larger than 30 to 36	12	15	1¼		

[1] For wheels under 1¼ inches thick F dimension shall not exceed 40 percent of wheel thickness.

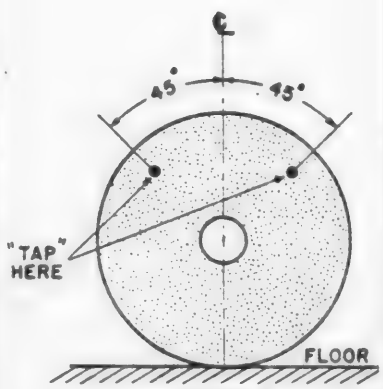
Latest ANSI Standard

Comments

Present Standard	Latest ANSI Standard	Comments
1910.215		

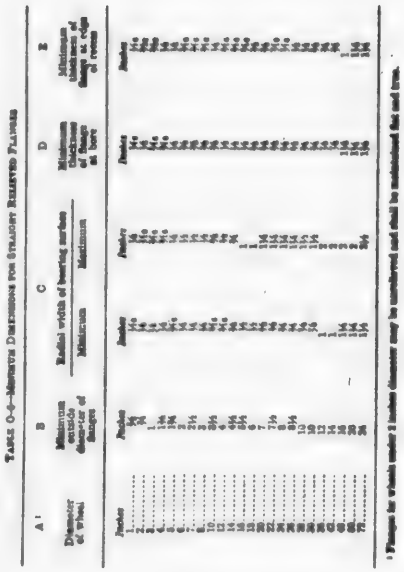
Light Wheels
Suspend from hole by small pin or finger

FIGURE NO. 0-25



Heavy Wheels
Support on clean hard floor

FIGURE NO. 0-26

Present Standard	Latest ANSI Standard	Comments
1910.215 		Does the information presented in Table O-6 enhance employee safety?

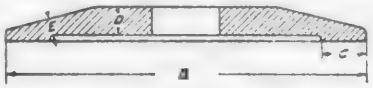


FIGURE NO. 0-32

Driving flange secured to spindle.

TABLE O-7—MINIMUM DIMENSIONS FOR STRAIGHT FLANGES—FOR MECHANICAL GRINDERS 12,500 S.F.P.M. TO 16,500 S.F.P.M.[1]

Wheel diameter	Wheel hole diameter	B Minimum flange diameter	D Minimum thickness of flange at bore	E Minimum thickness of flange at edge of undercut	F[2] (D-E) minimum thickness
20	6	8	1	1/4	1/2
20	8	10	1 1/2	5/8	3/4
24	12	13	2	1	1
30	12	15	2	1	1
36	12	16	2	1	1

[1] Flanges shall be of steel, quality SAE 1040 or equivalent, annealed plate, heat treated to R_c 25-30.
[2] For wheels under 1¼ inch thick F dimension shall not exceed 40 percent of wheel thickness.

1910.215

Present Standard

Latest ANSI Standard

Comments

Present Standard

1910.215

Latest ANSI Standard

Comments

TABLE O-8—MINIMUM DIMENSIONS FOR STRAIGHT FLANGES USED AS WHEEL SLEEVES FOR PRECISION GRINDING ONLY

Wheel diameter	Wheel hole diameter	B Minimum outside diameter of flange	D Minimum thickness of flange at bore	E Minimum thickness of flange at edge of undercut
Inches	*Inches*	*Inches*	*Inches*	*Inches*
12 to 14	5	7	1/2	3/16
Larger than 14 to 20	5	7	5/8	3/16
	6	8	1/2	3/16
	8	10	3/8	3/16
	10	11 1/2	5/16	3/16
	12	13 1/2	5/16	3/16
Larger than 20 to 30	8	10	3/4	1/4
	10	11 1/2	3/4	1/4
	12	13 1/2	3/4	1/4
	16	17 1/2	3/4	1/4
Larger than 30 to 42	12	13 1/4	3/4	1/2
	16	17 1/2	3/4	1/2
	18	19 1/2	3/4	1/2
	20	21 1/2	3/4	1/2
Larger than 42 to 60	16	20	1	3/4
	20	24	1	3/4
	24	29	1 1/4	3/4

NOTE: These flanges may be clamped together by means of a central nut, or by a series of bolts or some other equivalent means of fastening. For hole sizes smaller than shown in this table, use table 12.

Present Standard	Latest ANSI Standard	Comments
1910.215		

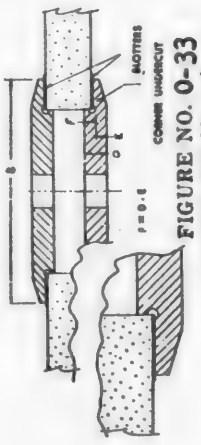


FIGURE NO. O-33
Central Nut Mounting
Driving flange secured to spindle.

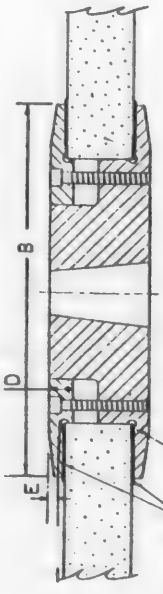


FIGURE NO. O-34
Multiple Screw Mounting
Driving flange secured to spindle.

Present Standard	Latest ANSI Standard	Comments
1910.215		

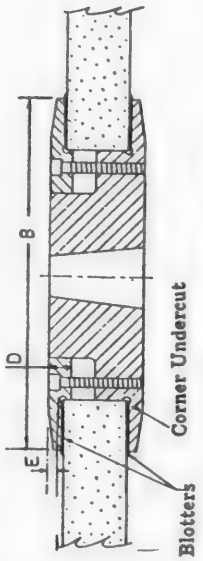


FIGURE NO. O-35

Driving flange secured to spindle.

Present Standard	Latest ANSI Standard	Comments
1910.215		

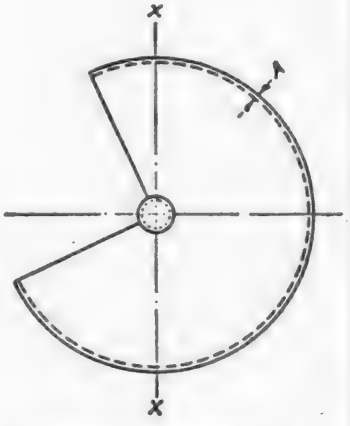
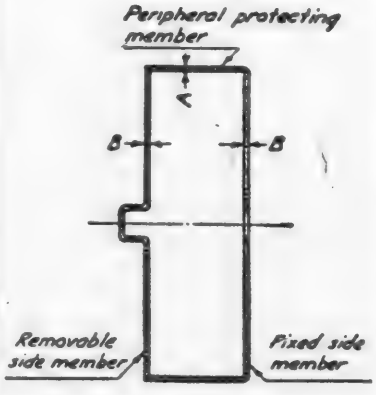


FIGURE NO. O-36



Section X-X

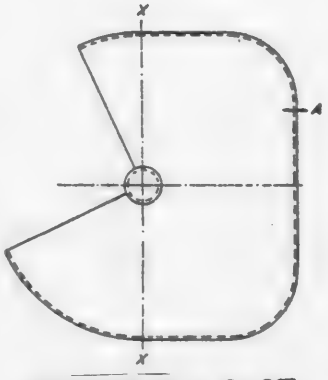


FIGURE NO. O-37

Present Standard	Latest ANSI Standard	Comments
1910.215		Table O-9 is another example of very specific information included in this standard. Should tables such as this one be retained and, if so, why?

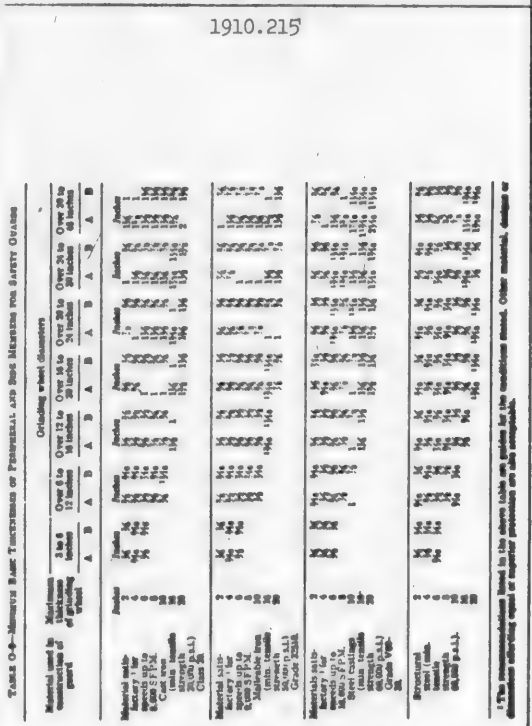


TABLE O-9—MINIMUM RIM THICKNESS OF PERIPHERAL AND SIDE GRINDING FOR SAFETY GUARDS

Material used in manufacture of guard	Minimum thickness of grinding wheel	Grinding wheel diameter: 2 to 6 inches (A / B)	Over 6 to 12 inches (A / B)	Over 12 to 16 inches (A / B)	Over 16 to 20 inches (A / B)	Over 20 to 24 inches (A / B)	Over 24 to 30 inches (A / B)	Over 30 to 36 inches (A / B)
Material sufficiently ductile to stretch 3 percent in a standard tensile test (min. tensile strength 30,000 p.s.i.) Class SS	Inches							
Material sufficiently ductile to stretch 3 percent in a standard tensile test (min. tensile strength 45,000 p.s.i.) Grade 2315A	Inches							
Materials sufficiently ductile to stretch 3 percent in a standard tensile test (min. tensile strength 45,000 p.s.i.) Grade 2315B	Inches							
Structural steel (min. tensile strength 60,000 p.s.i.)	Inches							

1 The recommendations listed in the above table are guides for the conditions named. Other material, designs or dimensions conforming equal or superior provisions are also adequate.

Present Standard	Latest ANSI Standard	Comments
1910.216 MILLS AND CALENDERS IN THE RUBBER AND PLASTICS INDUSTRIES	The American National Standard Institute (ANSI) has not changed the original source standard ANSI B28.1-1967, Mills and Calenders in the Rubber and Plastics Industries from which the current Section 1910.216 is derived. Therefore it is not reprinted here.	The definitions applicable to this section can be found in Section 1910.211(c). To these definitions it has been suggested that a definition for guarding by location be added in paragraph 1910.211(c)(4) as follows: "Guarding by location" means that a mill or calender is so installed that persons cannot normally reach through, over, under, or around to come in contact with the roll bite or be caught between a roll and an adjacent object.
(a) General requirements. (1) New installations. All new installations on or after August 31, 1971, shall be in conformity with this section. (2) Existing installations. All existing plant installations or equipment contracted for prior to August 31, 1971, shall comply with this section. (3) Auxiliary equipment. Mechanical and electrical equipment and auxiliaries shall be installed in accordance with this section and Subpart S of this part.		

Present Standard	Latest ANSI Standard	Comments
1910.216 (4) Mill roll heights. All new mill installations shall be installed so that the top of the operating rolls is not less than 50 inches above the level on which the operator stands, irrespective of the size of the mill. This distance shall apply to the actual working level, whether it be at the general floor level, in a pit, or on a platform. (b) Mill safety controls. (1) Safety trip control. A safety trip control shall be provided in front and in back of each mill. It shall be accessible and shall operate readily on contact. The safety trip control shall be one of the following types or a combination thereof. (i) Pressure-sensitive body bars. Installed at front and back of each mill having a 46-inch roll height or over. These bars shall operate readily by pressure of the mill operator's body. Pressure-sensitive body bars should be installed on new equipment. (ii) Safety triprod. Installed in the front and in the back of each mill and located within 2 inches of a vertical plane tangent to the front and rear rolls. The top rods shall be not more than 72 inches above the level on which the operator stands. The triprods shall be accessible and shall operate readily whether the rods are pushed or pulled.		(a)(4) Data is sought on the economic feasibility of bringing mills built prior to August 31, 1971, into compliance with the 50 inch mill roll height requirement.

Present Standard	Latest ANSI Standard	Comments
1910.216 (iii) Safety tripwire cable or wire center cord. Installed in the front and in the back of each mill and located within 2 inches of a vertical plan tangent to the front and rear rolls. The cables shall not be more than 72 inches above the level on which the operator stands. The tripwire cable or wire center cord shall operate readily whether cable or cord is pushed or pulled. (2) Fixed guards. A fixed bar across the front and one across the back of the mill approximately 40 inches vertically above the working level and 20 inches horizontally from the crown face of the roll should be used where they are applicable. (3) Auxiliary equipment. All auxiliary equipment such as mill divider, support bars, spray pipes, feed conveyors, strip knives, etc., shall be located in such a manner as to avoid interference with access to and operation of safety devices. (c) Calender safety controls. (1) Safety trip, face. A safety triprod, cable, or wire center cord shall be provided across each pair of in-running rolls extending the length of the face of the rolls. It shall be readily accessible and operate whether pushed or pulled. The safety tripping devices shall be located within reach of the operator and the bite.		(c)(1) It has been suggested that the safety tripping devices shall not be more than 72 inches nor less than 66 inches above the working floor or platform on which the operator standards, and shall be within easy reach of the operator when he is in normal working position.

Present Standard	Latest ANSI Standard	Comments
1910.216 (2) Safety trip, side. On both sides of calender and near each end of the face of the roll, there shall be a cable or wire center cord connected to the safety trip. These lines should be not more than 12 inches from the faces of the respective rolls and not less than 2 inches from the calender frame. They should be anchored to the frame not more than 6 inches from the floor or operator's platform. They shall operate readily when pushed or pulled. (d) Protection by location. (1) Mills. Where a mill is so installed that persons cannot normally reach through, over, under, or around to come in contact with the roll bite or be caught between a roll and an adjacent object, then, provided such elements are made a fixed part of a mill, safety control devices listed in paragraph (b) of this section shall not apply. (2) Calenders. Where a calender is so installed that persons cannot normally reach through, over, under, or around to come in contact with the roll bite or be caught between a roll and an adjacent object, then, provided such elements are made a fixed part of a calender, safety control devices listed in paragraph (c) of this section shall not apply.		

Present Standard	Latest ANSI Standard	Comments
1910.216		
(e) Trip and emergency switches. All trip and emergency switches shall not be of the automatically resetting type, but shall require manual resetting.		
(f) Stopping limits.		
(1) Determination of distance of travel. All measurements on mills and calenders shall be taken with the rolls running empty at maximum operating speed. Stopping distances shall be expressed in inches of surface travel of the roll from the instant the emergency stopping device is actuated.		(f)(1) It has been suggested that the last sentence of paragraph (f)(1) should read "Stopping distance shall be expressed in feet of . . . ."
(2) Stopping limits of mills. All mills irrespective of the size of the rolls or their arrangement (individually or group-driven) shall be stopped within a distance, as measured in inches of surface travel, not greater than 1-1/2 percent of the peripheral no-load surface speeds of the respective rolls as determined in feet per minute.		(f)(2) It has been suggested that paragraph (f)(2) should read ". . . . shall be stopped within a distance, as measured in feet of surface travel . . ." in order to conform with Fig. A1 of the appendix of ANSI B28.1-1967.
(3) Stopping limits for calenders. (i) All calenders, irrespective of size of the rolls or their configuration, shall be stopped within a distance, as measured in inches of surface travel, not greater than 1-3/4 percent of the peripheral no-load surface speeds of the respective calender rolls as determined in feet per minute.		(f)(3)(i) It has been suggested that stoping distance be measured in feet of surface travel rather than inches to conform with Fig. A2 of the appendix of ANSI B28.1-1967.

Present Standard	Latest ANSI Standard	Comments
1910.216 (ii) Where speeds above 250 feet per minute as measured on the surface of the drive roll are used, stopping distances of more than 1-3/4 percent are permissible. Such stopping distances shall be subject to engineering determination. (g) Alarm. Where an exposure is created by the operation, and the operators are not within sight or hearing of other employees, a suitable alarm device should be provided so that assistance will be available in case of accidents.		(f)(3)(ii) Comments are solicited on whether an upper limit for stopping distances is needed for employee safety. (g) Information and comments are requested on types of alarms that could be used, such as visual or audible alarms.

Present Standard	Latest ANSI Standard	Comments
1910.217 MECHANICAL POWER PRESSES	B11.1-1971	
(a) General requirements. (1) New installations. The requirements of this section shall apply to all mechanical power presses installed on or after August 31, 1971, except that the requirements of paragraphs (b)(13), (b)(14), and (c)(5) of this section shall be complied with by November 1, 1975. (2) Former installations. The requirements of this section shall apply to all mechanical power presses installed prior to August 31, 1971, except that the requirements of paragraphs (b) and (c)(5) of this section shall be complied with by November 1, 1975. [39 F.R. 41841, December 3, 1974.] (3) All installations. The requirements of this section pertaining to the care and use of mechanical power presses shall apply to all mechanical power press operations as of February 15, 1972.	This col. 2 is partially blank as ANSI has not approved a revision to B11.1-1971 which OSHA adopted May 29, 1971. Col. 1 substantially conforms to B11.1-1971, except for portions amended on Dec. 3, 1974. Amendments are identified by a heavy line adjacent to new text.	There is no officially approved ANSI B11.1 revision at this time. OSHA has reviewed the ANSI B11.1 Standards Committee draft revision dated Jan. 21, 1974 and some entries in Col. 3 are based on changes in the ANSI draft. These entries are identified as tentative B11.1 revisions.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(4) Reconstruction and modification. It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with paragraph (b) of this section.		(4) Comment is invited on the need to clarify this requirement which is not applicable to other than employers subject to the Act.
(5) Excluded machines. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section.	B11.1-1971 Scope- The requirements of this standard apply only to those mechanically powered machines that shear, punch, form, or dies attached to slides, commonly referred to as mechanical power presses. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines, and similar types of fastener applicators are excluded from the requirements of this standard.	(5) Comment and suggestions are solicited on the need to add the names of additional excluded machines. Should a scope statement be added based on B11.1-1971 scope? Expansion of the terms of this standard to other than mechanical power presses has produced considerable confusion among employers and others. Should die making operations be subject to different requirements? What are the features that distinguish a mechanical power press from other machines not covered by this section? Comments and suggestions are invited on the need to specify that press brake machines used for production with dies (used as a mechanical power press) are subject to the safeguarding rules of .217.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(b) Mechanical power press guarding and construction, general.		(b) A petitioner has suggested that information on design of press components and controls for new and modified machines be covered by a reference to ANSI B11.1-1971. Comment is solicited on whether the construction features of the press component (paragraph (b)) are more properly obligations of press builders not subject to the Act. Should design and construction requirements in (b) be applicable only to new presses? Which of the requirements of (b) should employers be responsible for compliance with?
(1) Hazards to personnel associated with broken or falling machine components. Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, or loosening and falling or release of mechanical energy (i.e. broken springs).		(b)(1) Comments are invited on the need to revise this paragraph to specify "machine parts", and to make reference to 1910.219 for mechanical power transmission apparatus external to the drivein machine (press component). A petitioner has recommended that specific provisions for the safety of automatic loading or unloading mechanisms be added. Comment is invited on the need to regulate such machinery and recommendations for new requirements.
(2) Brakes. Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement. Brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel.		
[38 F.R. 16223, June 21, 1973.]		

Present Standard	Latest ANSI Standard	Comments
1910.217 (3) Machines using full revolution positive clutches. (i) Machines using full revolution clutches shall incorporate a single-stroke mechanism. (ii) If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, and designed to prevent interleaving of the spring coils in event of breakage.		(b)(3) Comments and suggestions are solicited for a requirement to clarify that presses designed for and operated only in continuous mode do not require a single stroke mechanism. Should all new full revolution clutch presses built after Aug. 31, 1978 be required to have single stroke capability? Why? Comments and recommendations are solicited on whether para. (3) should be modified to cover "all machines," not limited to those using full revolution clutches. The intent of this provision is to protect against hazards present when a press without a single stroke capability is used in operations requiring a single stroke. Should this provision apply to a press on continuous run when feeding is automatic and the point of operation is fully guarded? 3.4 Machines Using Full Revolution Clutches (tentative B11.1 revision) 3.4.1 Single Stroke A new power press component constructed after 8/31/77 shall incorporate a single stroke mechanism. EXCEPTION: Any power press component designed specifically for the continuous mode of stroking need not incorporate a single stroke mechanism.

Present Standard	Latest ANSI Standard	Comments
1910.217 (4) Foot pedals (treadle). (i) The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal. (ii) A pad with a nonslip contact area shall be firmly attached to the pedal. (iii) The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in event of breakage. (iv) If pedal counterweights are provided, the path of the travel of the weight shall be enclosed. (5) Hand operated levers. (i) Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping. (ii) The operating levers on handtripped presses having more than one operating station shall be interlocked to prevent the tripping of the press except by the "concurrent" use of all levers.		(b)(4) It has been suggested that paragraph (4) be modified to require additional protection against unintended actuation through (1) utilization of a spring-loaded gate at the entrance of pedal cover, or (2) mandatory use of barrier guard at point of operation when foot pedal is employed? Comments are solicited on this suggested modification. Comment is invited on the need to limit foot pedal actuation to those presses fitted with an acceptable guard only and not allow foot pedal operation when a device is used to protect the operator. An acceptable guard would be a fixed barrier guard while an example of a device are pull-outs.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(6) Two-hand trip.		
(i) A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.		
(ii) Two-hand trip systems on full revolution clutch machines shall incorporate an antirepeat feature.		(b)(6) Comments are invited on the use of trips on part revolution clutch presses as the standard is silent on such application.
(iii) If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls.		
(7) Machines using part revolution clutches.		
(i) The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized.		
(ii) A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactuation of the clutch shall require use of the operating (tripping) means which has been selected.		(b)(7)(ii) Comments are solicited on the need to change this requirement to insure that each operator station set of controls is provided with an emergency stop control. Should the color red be required for the stop control at each station?

Present Standard	Latest ANSI Standard	Comments
1910.217		
(iii) A means of selecting Off, "Inch," Single Stroke, and Continuous (when the continuous function is furnished) shall be supplied with the clutch/brake control to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer.		(b)(7)(iii) Comment is invited on the various means of supervision presently available other than key-lock or positive disconnect (for foot control or hand control cable).
(iv) The "Inch" operating means shall be designed to prevent exposure of the workers hands within the point of operation by: (a) Requiring the concurrent use of both hands to actuate the clutch, or (b) Being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control.		(b)(7)(iv) Comments and information are solicited on the use of inch control by operators starting a new coil on automatic feed operations. It has been suggested in a petition to OSHA that the following provision be added: "Where strip stock must be threaded manually through die, a "set-up" circuit may be used to provide a single inching means for the initial threading. Such a circuit shall be deenergized by a change of the mode selector." A petitioner has suggested the following: "Where strip stock must be threaded manually through a die, a "set-up" circuit may be used to provide a single inching means for the initial threading. Such a circuit shall be deenergized by a change of the mode selector."
(v) Two-hand controls for single stroke shall conform to the following requirements: (a) Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.		(b)(7)(v) Comment is desired on the need to required only two-hand controls used as a point of operation device to conform to the construction requirements. Comment is invited on the need to add a requirement for multiple operator part revolution clutch presses similar to that specified for full revolution clutch machines in (b)(6)(iii). The requirement would provide for complete sets of controls for each operator.

Present Standard	Latest ANSI Standard	Comments
1910.217 (b) The control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke. (c) The control system shall incorporate an antirepeat feature. (d) The control systems shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single-stroke, two-hand controls manufactured and installed on or after August 31, 1971. (vi) [Reserved] (vii) Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operators' controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all operating stations are bypassed.		(b)(7)(vii) Comments and information on means of supervising controls are solicited. Should two hand buttons be waived where operator is stationed at such distance from the press that he is not exposed to the hazzard of the die? Comments are solicited on a requirement for a prior action or decision by the operator each time continuous stroking is initiated regardless of whether the previous run was continuous or not.

Present Standard	Latest ANSI Standard	Comments
1910.217 (viii) Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of Continuous on the stroking selector, before actuation of the operating means will result in continuous stroking. (ix) If foot control is provided, the selection method between hand and foot control shall be separate from the stroking selector and shall be designed so that the selection may be supervised by the employer. (x) Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control. (xi) The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur. This requirement shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971, but shall not apply to machines intended only for continuous, automatic feeding applications.		(b)(7)(x) Same comment as (b)(4) above.

Present Standard	Latest ANSI Standard	Comments
1910.217 (xii) The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction. (xiii) The clutch/brake control shall automatically deactivate in event of failure of the power or pressure supply for the clutch engaging means. Reactivation of the clutch shall require restoration of normal supply and the use of the tripping mechanism(s). (xiv) The clutch/brake control shall automatically deactivate in event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s). (xv) Selection of bar operation shall be by means capable of being supervised by the employer. A separate pushbutton shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is deenergized.		

Present Standard	Latest ANSI Standard	Comments
1910.217 (8) Electrical. (i) A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.		(b)(8) Comments and information are solicited on the need to provide a separate main power disconnect on each individual press rather than a master power disconnect for a line of press machines. A petitioner has suggested that the word "only" in paragraph (i) be deleted. This would permit locking in the on position. Would this create a hazzard? Comment is solicited.
(ii) The motor start button shall be protected against accidental operation.		
(iii) All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions are restored to normal.		(b)(8)(iii) Comment and information is invited on this requirement which would require presses powered by fractional horsepower motors to replace presently installed positive starting switches which do not open the circuit upon loss of power.
(iv) All a.c. control circuits and solenoid valve coils shall be powered by not more than a nominal 240-volt d.c. supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanisms shall be isolated from any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage control. All d.c. control circuits shall be powered by not more than a nominal 240-volt d.c. supply isolated from any higher voltages.		(b)(8)(iv) The typographical errors will be corrected, namely change 240 volt d.c. to 120 volt a.c.

Present Standard	Latest ANSI Standard	Comments
1910.217 (v) All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press. (vi) Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of a control component to function properly, including relays, limit switches, and static output circuits. [39 F.R. 41841, December 3, 1974.] (9) Slide counterbalance systems. (i) Spring counterbalance systems when used shall incorporate means to retain system parts in event of breakage. (ii) Spring counterbalances when used shall have the capability to hold the slide and its attachments at midstroke, without brake applied. (iii) Air counterbalance cylinders shall incorporate means to retain the piston and rod in case of breakage or loosening. (iv) Air counterbalance cylinders shall have adequate capability to hold the slide and its attachments at any point in stroke, without brake applied.		(b)(8)(vi) Comment and information is solicited on the need to establish more definitive criteria for electrical clutch/brake control circuits. Should this requirement be limited to electrical systems if feasible on other types?

Present Standard	Latest ANSI Standard	Comments
1910.217		
(v) Air counterbalance cylinders shall incorporate means to prevent failure of capability (sudden loss of pressure) in event of air supply failure.		
(10) Air controlling equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed.		
(11) Hydraulic equipment. The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system.		
(12) Pressure vessels. All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code for Pressure Vessels, 1968 Edition.		(b)(12) Comment is solicited on updating the requirement to the latest ASME code for new vessels.
(13) Control reliability. When required by paragraph (c)(5) of this section, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries.		(b)(13) Comments and information are solicited on the need for more definitive criteria to complement this performance standard. How are the terms of the standard being interpreted and met when modifying presses as required by paragraph (c)(5). What simple tests are being conducted? Comments and recommendations for tests which are possible on all machines are solicited.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(14) Brake system monitoring. When required by paragraph (c)(5) of this section, the brake monitor shall meet the following requirements:		(b)(14) Comments and information are invited on the application of brake monitors. What if any problems have been encountered in meeting the performance standard? Has the addition of brake monitoring added substantially to brake performance, reliability of safeguard, and operator safety? Should the requirement be modified to require brake performance to be monitored on each application of the brake rather than each stroke. The current rule prohibits operating presses "on the hop."
(i) Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in paragraph (c)(3)(iii)(e) or (c)(3)(vii)(c) of this section. The brake monitor used with the Type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer.		(b)(14)(i) Comment is invited on the need to add the requirement that the brake monitor used with Type B gate also prevent activation of a successive stroke as is required when used with the other means of safeguarding such as presence sensing or two-hand controls.
(ii) Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in paragraph (b)(14)(i) of this section; and		
[40 F.R. 3982, January 27, 1975.]		

Present Standard	Latest ANSI Standard	Comments
1910.217 (iii) Be constructed and installed in a manner to monitor brake system performance on each stroke. [39 F.R. 41841, December 3, 1974.] (c) Safeguarding the point of operation. (1) General requirements. (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10.		(c)(1) Comments are solicited on the need to clarify the intent of this rule to insure protection of press operators and not others such as passersby in the vicinity of the press. Should the provisions for point of operation safeguarding apply to supervisors or passersby in the vicinity of the press or be limited to protection of the operator? Comments and supporting information to allow the sliding holster to qualify as a form of safeguard or part of the safeguarding system when 2-hand trips or controls do not meet the safety distance requirements are solicited. Should a performance standard be added to permit newer forms of safeguarding to be used other than types currently included in the standard? A petitioner has recommended the following change: It shall be the responsibility of the employer to designate, provide, and insure the use of point of operation guards or properly applied and adjusted point of operation devices on every mechanical power press loaded or unloaded manually. Shall guarding by location be allowed when operator station is established at a distance from which the hazardous moving parts cannot be reached?

Present Standard	Latest ANSI Standard	Comments
1910.217		(c)(1) In the case of automatic feed with no operator would the feeding apparatus function as an adequate protective barrier for the point of operation? What are some of the newer forms of safeguarding? What criteria should be used to judge the acceptability of new forms of safeguarding?
(ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10.		(c)(1)(ii) Comment is invited on the measurement of 1/4-inch opening. Should this dimension be gauged with the die clear or with the work piece in position as is the case in the ANSI tentative B11.2 hydraulic power press draft standard?
(2) Point of operation guards. (i) Every point of operation guard shall meet the following design, construction, application, and adjustment requirements: (a) It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under or around the guard; (b) It shall conform to the maximum permissible openings of Table O-10; (c) It shall, in itself, create no pinch point between the guard and moving machine parts;		

Present Standard	Latest ANSI Standard	Comments
1910.217 (d) It shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts; (e) It shall facilitate its inspection, and (f) It shall offer maximum visibility of the point of operation consistent with the other requirements. (ii) A die enclosure guard shall be attached to the die shoe or stripper in a fixed position. (iii) A fixed barrier guard shall be attached securely to the frame of the press or to the bolster plate. (iv) An interlocked press barrier guard shall be attached to the press frame or bolster and shall be interlocked with the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinged or movable sections of the guard are in position to conform to the requirements of Table O-10.		(c)(2)(iv) Comments and information are invited on the need to allow the guard to be attached to the die shoe also. Should the difference between the guard and an interlocked barrier gate device be clarified to prevent confusion? Comment is invited on the desirability of establishing a criteria for interlocks which are used as part of several safeguard systems. Suggestions for suitable criteria are requested.

Present Standard	Latest ANSI Standard	Comments
1910.217 (v) The hinged or movable sections of an interlocked press barrier guard shall not be used for manual feeding. The guard shall prevent opening of the interlocked section and reaching into the point of operation prior to die closure or prior to the cessation of slide motion. See paragraph (c)(3)(ii) of this section regarding manual feeding through interlocked press barrier devices. [39 F.R. 41841, December 3, 1974.]		(c)(2)(v) 5.2.3 Interlocked Barrier Guard (Tentative B11.1 revision) An interlocked barrier guard, when used, shall be attached to the press component frame, bolster plate or die shoe and shall be interlocked with the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinged or movable sections of the guard, are in position to conform to the requirements of Fig. 1 and Table 1. The hinged or movable sections of this guard shall not be used for feeding. This guard shall be applied as to prevent opening of the interlocked section and reaching into the point of operation prior to die closure and/or slide motion stopping. E5.2.3 Interlocked Barrier Guard (Tentative B11.1 revision explanation) The interlocked press barrier guard is a form of press barrier guard containing a hinged or movable section designed for die changing (when the die size is small enough to so permit) or for removing a jammed part or material or scrap. Interlocking must be performed to defeat attempts to run the press with the hinged or movable sections open or in a non-protecting position.

Present Standard	Latest ANSI Standard	Comments
1910.217		The door or movable section, with possibility of unauthorized bypassing of the interlock capability, represents a definite compromise with this guard.
(vi) The adjustable barrier guard shall be securely attached to the press bed, bolster plate, or die shoe, and shall be adjusted and operated in conformity with Table O-10 and the requirements of this subparagraph. Adjustments shall be made only by authorized personnel whose qualifications include a knowledge of the provisions of Table O-10 and this subparagraph.		
(vii) A point of operation enclosure which does not meet the requirements of this subparagraph and Table O-10 shall be used only in conjunction with point of operation devices.		
(3) Point of operation devices.		
(i) Point of operation devices shall protect the operator by:		
(a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or		
(b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if		

Present Standard	Latest ANSI Standard	Comments
1910.217 they are inadvertently located in the point of operation, as the dies close; or [39 F.R. 41841, December 3, 1974.] (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or (d) [Reserved] (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or (f) Enclosing the point of operation before a press stroke can be initiated and maintaining this closed condition until the motion of the slide had ceased; or (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.		

Present Standard	Latest ANSI Standard	Comments
1910.217 (ii) A gate or movable barrier device shall protect the operator as follows: (a) The Type A gate or movable barrier device shall protect the operator in the manner specified in paragraph (c)(3)(i)(f) of this section, and (b) A Type B gate or movable barrier device shall protect the operator in the manner specified in paragraph (c)(3)(i)(g) of this section. (iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c)(3)(i)(a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide. (a) The device may not be used on machines using full revolution clutches.		(c)(3)(iii)(a) Comments and other evidence relating to this prohibition are solicited.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(b) The device may not be used as a tripping means to initiate slide motion.		(c)(3)(iii)(b) Comments and information are solicited concerning this prohibition. It should be noted that on September 2, 1976, OSHA granted a demonstration variance to Interlake Stamping Corporation, Willoughby, Ohio. The variance permits Interlake to operate five specially equipped Bliss presses for a period of one year by using presence sensing devices to actuate the press. The system installed by Interlake at the time the variance was first sought includes not only the light curtain but a sophisticated self-checking circuitry package that monitors all functions constantly and shuts the press down in the event of a malfunction. During the one-year trial period, Interlake will operate five sensing device equipped presses and five control presses with conventional actuation on similar work. Detailed records will be kept and the findings made available to OSHA. If the experiment is successful OSHA will consider modifying the existing standards to permit press actuation by sensing devices. In the meantime, of course, the variance applies only to Interlake.
(c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.		

Present Standard	Latest ANSI Standard	Comments
1910.217 (d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding. (e) The safety distance (Ds) from the sensing field to the point of operation shall be greater than the distance determined by the following formula: Ds = 63 inches/second x Ts where: Ds = minimum safety distance (inches); 63 inches/second =hand speed constant; and Ts = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds). (f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device.		(c)(3)(iii)(e) Comments, data, statistics or studies concerning operator hand speed are solicited to reaffirm the current constant or to indicate that a change is appropriate. Comment and information on the use of the formula for determining safety distance are solicited. What other factors should be considered in locating control buttons or presence sensing devices to realize the calculated safety distance? Comment is solicited on the necessity to specify the point in the press tooling from which the safety distance is measured. Information on different methods used by employers or others to determine safety. Comments are invited on the need to change the word "guards" to safeguards to allow use of supplemental presence sensing devices to meet this rule.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(iv) The pull-out device shall protect the operator as specified in paragraph (c)(3)(i)(b) of this section and shall include attachments for each of the operator's hands.		
(a) Attachments shall be connected to and operated only by the press slide or upper die.		(c)(3)(iv)(a) Two variances have been granted which permit pull-outs to be operated by means other than direct connection to the slide. Comments and suggestions are solicited on the advisability of allowing pull-outs to be actuated by other parts of the press or separate means.
(b) Attachment shall be adjusted to prevent the operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the dies close.		
(c) A separate pull-out device shall be provided for each operator if more than one operator is used on a press.		
(d) Each pull-out device in use shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance or repair or both shall be performed and completed before the press is operated. Records of inspections and maintenance shall be kept in accordance with paragraph (e) of this section.		(d) Comment is invited on a suitable record retention requirement.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(v) The sweep device, shall protect the operator as specified in paragraph (c)(3)(i)(b) of this section, by removing his hands safely to a safe position if they are inadvertently located in the point of operation, as the dies close or prior to tripping the clutch. Devices operating in this manner shall have a barrier, attached to the sweep arm in such a manner as to prevent the operator from reaching into the point of operation, past the trailing edge of the sweep arm on the downward stroke of the press. This device may not be used for point of operation safeguarding after December 31, 1976. (a) The sweep device must be activated by the slide or by motion of a foot pedal triprod. (b) The sweep device must be designed, installed and operated so as to prevent the operator from reaching into the point of operation before the dies close. (c) The sweep device must be installed so that it will not itself create an impact or shear hazard between the sweep arm and the press tie rods, dies, or any other part of the press or barrier.		(v) Comment is solicited on the use of a sweep device as a backup safeguard when another acceptable device is in use after December 31, 1976.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(d) Partial enclosure conforming with this paragraph (c)(3)(v), as to the area of entry which they protect, must be provided on both sides of the point of operation to prevent the operator from reaching around or behind the sweep device and into the point of operation after the dies start to close. Partial enclosures shall not themselves create a pinch point or shear hazard.		
[39 F.R. 41841, December 3, 1974.]		
(vi) A holdout or a restraint device shall protect the operator as specified in subdivision (i)(c) of this subparagraph and shall include attachments for each of the operator's hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provided for each operator if more than one operator is required on a press.		
(vii) The two hand control device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.		

Present Standard	Latest ANSI Standard	Comments
1910.217 (a) When used in press operations requiring more than one operator, separate two hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop. (b) Each two hand control shall meet the construction requirements of paragraph (b)(7)(v) of this section. (c) The safety distance (Ds) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula: Ds = 63 inches/second x Ts; where: Ds = minimum safety distance (inches); 63 inches/second = hand speed constant; and Ts = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).		(c)(3)(vii)(c) Comments and information are solicited on the calculation of brake stopping time when measured at approximately 90° of crank shaft rotation. Is this test difficult to reproduce? What other position of slide travel would be more accurate for obtaining stopping time?

Present Standard	Latest ANSI Standard	Comments
1910.217		
(d) Two hand control shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.		(c)(3)(vii)(d) Comment and information is solicited on the various means available for fixing two-hand controls.
(viii) The two hand trip device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.		Does paragraph (viii) require clarification by including the actual language of (c)(3)(i)(e) rather than a simple reference to that section? Is it sufficiently clear that two-hand trip devices once pressed do not have to be held during the downstroke, and the slide will stop only after it has completed a full cycle. The device may be used on all presses. (c)(3)(viii) Comments and information are invited on the development of a different safety distance formula for use when two-hand trips are used as a safeguard on part revolution clutch presses. The critical time period is deemed to be that for the closing part of the stroke or 1/2 revolution of crankshaft which differs with time required in full revolution clutch press formula.
(a) When used in press operations requiring more than one operator, separate two hand trips shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide.		
[40 F.R. 3982, January 27, 1975.]		

Present Standard	Latest ANSI Standard	Comments
1910.217 (b) Each two hand trip shall meet the construction requirements of paragraph (b)(6) of this section. (c) The safety distance (Dm) between the two hand trip and the point of operation shall be greater than the distance determined by the following formula: Dm = 63 inches/second x Tm; where: Dm = minimum safety distance (inches); 63 inches/second = hand speed constant; and Tm = the maximum time the press takes for the die closure after it has been tripped (seconds). For full revolution clutch presses with only one engaging point Tm is equal to the time necessary for one and one-half revolutions of the crankshaft. For full revolution clutch presses with more than one engaging point, Tm shall be calculated as follows: $Tm = \left\{ \frac{1}{2} + \frac{1}{\text{Number of engaging points per revolution}} \right\} \times$ time necessary to complete one revolution of the crankshaft (seconds)		(c)(3)(vii)(c) The printing of the formula seemingly places 1/2 below the line for 1 no. of engaging points per revolution. This will be corrected to agree with the text of paragraph (c).

Present Standard	Latest ANSI Standard	Comments
1910.217 (d) Two hand trips shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls. (ix) [Revoked] [39 F.R. 41841, December 3, 1974] (4) Hand feeding tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protection device and shall not be used in lieu of the "guards" or devices required in this section. (5) Additional requirements for safeguarding. Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sensing device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding.		(c)(3)(vii)(d) Comment and information is invited on the means presently used to meet this performance requirement for fixing the position of portable control stations. (c)(4) Comment and other evidence of the successful use of hand feeding tools to achieve "hands out of dies" is solicited. Should use of hand tools for feeding continue to qualify as hands out of dies" for the purpose of waiving para. (c)(5) requirements? (c)(5) Comments and suggestions are solicited on experience by press users who meet this new OSHA requirement. Is the requirement clear in its limited application with regard to use of Type B gates? Hands in dies feeding only? The typographical errors in the sentence will be corrected to read ". . . sensing device or type B gate . . . : Comments are solicited on the acceptability of alternative (redundant) safe guarding as advocated in the draft revision of ANSI B11.1 standard in lieu of OSHA (c)(5) "Additional requirements for safeguarding."

Present Standard	Latest ANSI Standard	Comments
1910.217 (i) the employer shall use a control system and a brake monitor which comply with paragraphs (b)(13) and (14) of this section. This requirement shall be complied with by November 1, 1975;		A petitioner has suggested that (c)(5) be limited to presence sensing devices. Comments on this limitation are invited. (c)(5)(i) Comments and suggestions are solicited on the need to rewrite to clarify (c)(5)(i) the fact that (b)(13) modifies control system only and is not intended to apply to (b)(14) the brake monitor. Comment is solicited on whether additional safeguarding requirements should be placed on full revolution clutch presses too. The use of redundant safeguards appears to offer protection to operators from repeat or unintended strokes. Data and information on repeat strokes resulting from press component malfunction. Are repeat strokes due to press component malfunction a frequent occurrence? Are malfunctions resulting in repeats investigated and confirmed? What types of press malfunction occur? The tentative ANSI B11.1 revised draft prescribes redundant safeguarding for operators manually feeding with hands in dies. Comment is invited on the acceptability of such safeguarding in lieu of present Section (c)(5) requirements.

Present Standard	Latest ANSI Standard	Comments
1910.217 (ii) the exception in paragraph (b)(7)(v)(d) of this section for two hand controls manufactured and installed before August 31, 1971 is not applicable under this paragraph (c)(5); (iii) the control of air clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur, where a part revolution clutch is employed. The exception in paragraph (b)(7)(xi) of this section for controls manufactured and installed before August 31, 1971, is not applicable under this paragraph (c)(5).		

Present Standard	Latest ANSI Standard	Comments
1910.217		A petition to OSHA has suggested the following provisions be inserted. Please comment. (c)(6) Where the operator is required to feed or remove parts by placing one or both hands in the point of operation, devices shall prevent the operator from reaching into the point of operation until the slide has stopped. (c)(7) If a foot trip or foot control is being used and an enclosure guard or restraints meeting the requirements of subparagraph (c)(2) or (c)(3)(i)(g) or (c)(3)(i)(c) is not used, the employer shall provide a second safeguarding device which shall insure that the operator's hands are out of the point of operation when slide motion is initiated.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(d) Design, construction, setting and feeding of dies.		(d) ANSI B11.1 revised would authorize hands in dies when the employer has found it infeasible to follow a hands out of dies feeding method. Should OSHA require employer to investigate the possibility of hands out of dies feeding in every case to prove it is not feasible? What are the operator safety benefits of hands out of dies or use of redundant safeguarding for hands in dies? The reports of injuries to press operators have disclosed that serious accidents are occuring during both hands in or hands out operations. The hands out of dies reports also show an increased number of injuries during set up and try out.
(1) General requirements. Effective February 1, 1975, the employer shall: (i) use dies and operating methods designed to control or eliminate hazards to operating personnel, and (ii) furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die, so that no employee need reach into the point of operation for such purposes.		(d)(1)(ii) A peritioner suggests adding ". .hand tools or other expendable devices for freeing . . ." Comment is invited on the suggested addition.
(2) [Reserved]		
(3) Scrap handling. The employer shall provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded in accordance with paragraph (b) of this section and with §1910.219.		(3) The typographical error which resulted in para. (b) instead of (c) will be corrected.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(4) Guide post hazard. The hazard created by a guide post (when it is located in the immediate vicinity of the operator) when separated from its bushing by more than one-fourth inch shall be considered as a point of operation hazard and be protected in accordance with paragraph (c) of this section.		
(5) Unitized tooling. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall be safeguarded in accordance with the requirements of paragraph (b) of this section.		(d)(5) Same comment as (3) above.
(6) Tonnage, stroke, and weight designation. All dies shall be:		(d)(6) Should the word "stamped" be expanded to include "affixed, marked, or labelled so as to be visible?"
(i) Stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter;		6.5 Indentification on Dies (Tentative B11.1 revision)
(ii) Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and		6.5.1 Old Dies
(iii) Stamped to indicate complete die weight when handling equipment may become overloaded.		All dies constructed or reconstructed after August 31, 1971 shall be: 1) Stamped or labelled with the tonnage and stroke requirements, or have these characteristics recorded, if these records are readily available to the die setter, 2) Stamped or labelled to indicate upper die weight (or have these characteristics recorded, if these records are readily available to the die setter) when necessary for air counterbalance pressure adjustment or when inertia

Present Standard	Latest ANSI Standard	Comments
1910.217		
		loading considerations so require, and 3) Stamped or labelled to indicate complete die weight when handling equipment may be overloaded. Exception: Where dies have their characteristics recorded within a work scheduling facility, and are scheduled into definite press components having their characteristics also recorded within this work scheduling facility, requirement (1) need not apply.
(7) Die fastening. Provision shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used.		(d)(7) Comments and information are solicited on means of fastening dies. Comments and suggestions are solicited on whether an exception should be provided when guide posts are used, and the operator is not required to place hands in the point of operation for feeding.
(8) Die handling. Handling equipment attach points shall be provided on all dies requiring mechanical handling.		
(9) Diesetting. (i) The employer shall establish a diesetting procedure that will insure compliance with paragraph (b) of this section.		(d)(9)(i) The typographical error which substituted para. (b) for the correct reference para. (c) will be changed.
(ii) The employer shall provide spring loaded turnover bars, for presses designed to accept such turnover bars.		

Present Standard	Latest ANSI Standard	Comments
1910.217		
(iii) The employer shall provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined.		
(iv) The employer shall provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired in the press.		(d)(9)(iv) Two variances have been requested to permit use of die safety blocks during feeding operations. One applicant/employer would use hand placed blocks and the other automatic powered slide blocks. Comments and data are invited on the feasibility of using of die blocks as operator safeguards during hands in dies feeding operations.
(v) The employer shall provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and diesetters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches or dies.		
(e) Inspection, maintenance, and modification of presses.		
(1) Inspection and maintenance records.		(e)(1) Comments are solicated on the need to set a period for retention of records by employers. Should keeping of records be optional? What systems are currently used for recordkeeping? Should inspection be waived on presses operated with hands out of dies feeding? How long should the record be kept? Should record be kept until replaced by most recent record?

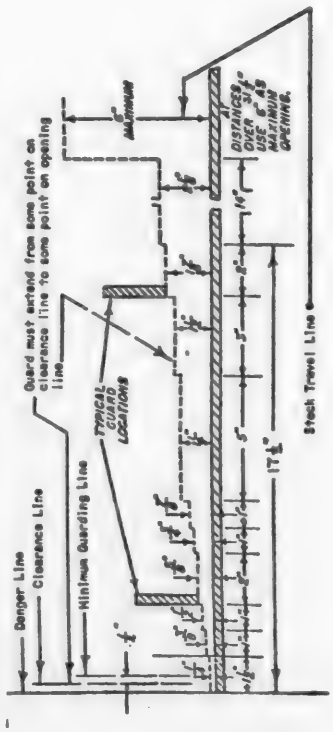
Present Standard	Latest ANSI Standard	Comments
1910.217		
(i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed.		
(ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, antirepeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. The employer shall maintain records of these inspections and the maintenance work performed. These requirements do not apply to those presses which comply with paragraph (b)(13) and (14) of this section.		A petition filed with OSHA urges the subsection (e)(1)(ii) and (e)(2) be deleted and the following provision be adopted. (ii) "At the start of each operator shift, following a new die set-up, or when operators are changed, the employer shall require the operator to visually test the designated means of safeguarding the point of operation to insure that guards and devices are in safe operating condition or adjustment. Where the operator manually loads or unloads the press, the slide stopping position, antirepeat and single stroke features of the controls shall be included. Necessary repairs or adjustments shall be made before the press is returned to production."
(2) Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified.		
(3) Training of maintenance personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting, and maintaining power presses.		(e)(3) Comments and suggestions as to the contents of an employee training program are solicited.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(f) Operation of power presses.		
(1) Employment of minors. The employer shall permit no one under 18 years of age to operate or assist in the operation of machinery covered in this section, except that this paragraph shall not be deemed to prohibit the employment of persons who are 16 of 17 years of age in an apprentice ship training program which meets the requirements contained in §§ 570.59 and 570.50(b) and (c) of this title.		
(2) Instruction to operators. The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this section. The employer shall insure by adequate supervision that correct operating procedures are being followed.		(f)(2) A petition to OSHA urges that "instruction" specifically to include an explanation of the designated safeguard and how it is designed and adjusted for the protection of the operator. Same as above.
(3) Work area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample foom for cleaning machines, handling material, work pieces, and scrap shall also be provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil, and water.		
(4) Overloading. The employer shall operate his presses within the tonnage and attachment weight ratings specified by the manufacturer.		(f)(4) Comment is solicited on whether this is a requirement for peoperty protection rather than employee safety and therefore should be deleted. What are the hazards to employees that occur when presses are operated at higher that rated tonnage?

Present Standard	Latest ANSI Standard	Comments
1910.217 **This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.** TABLE O–10 *Distance of opening from point of operation hazard (inches)* — *Maximum width of opening (inches)* ½ to 1½ — ¼ 1½ to 2½ — ⅜ 2½ to 3½ — ½ 3½ to 5½ — ⅝ 5½ to 6½ — ¾ 6½ to 7½ — ⅞ 7½ to 12½ — 1¼ 12½ to 15½ — 1½ 15½ to 17½ — 1⅞ 17½ to 31½ — 2⅛ (g) Reports of injuries to employees operating mechanical power presses. The employer shall, within 30 days of the occurrence, report to either the Director of the Office of Standards Development, OSHA, U.S. Department of Labor, Washington, D.C. 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees. The following information shall be included in the report.		(g) OSHA has collected over 800 reports of injuries since February 2, 1975. The analysis of these reports points out certain weaknesses in the present standards for the mechanical power press. Requirements needing improvement are: barrier guards, pull-outs, handtools, scrap removal, and mode selection. Comments are invited on the need to require reporting of more information including date of injury occurrence, age of press, time of day, etc. to enable more detailed analysis of report data.

Present Standard	Latest ANSI Standard	Comments
1910.217 (i) Employer's name, address and location of the workplace (establishment). (ii) Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance or other). (iii) Type of clutch used on the press (full revolution, part revolution, or direct drive). (iv) Type of safeguard(s) being used (two hand control, two hand trip, pull-outs, sweeps or other). If the safeguard is not described in this section, give a complete description.		Persons having supported data on employee casualties when operating presses are requested to submit such data for review and analysis. Suggestions are solicited for systems for analysis of work injury data.

Present Standard	Latest ANSI Standard	Comments
1910.217		
(v) Cause of the accident (repeat of press, safeguard failure, removing stuck part of scrap, no safeguard provided, no safeguard in use, or other). (vi) Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other). (vii) Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other). (viii) Number of operators required for the operation and the number of operators provided with controls and safeguards.		Comment is solicited on the advisability of discontinuing reporting by January 1, 1978 or some other date.

Present Standard	Latest ANSI Standard	Comments
1910.217		
 **Explanation of above diagram:** This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation). The *clearance line* marks the distance required to prevent contact between guard and moving parts. The *minimum guarding line* is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line. The various openings are such that for average size hands an operator's fingers won't reach the point of operation. After installation of point of operation guards and before a job is released for operation a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation.		The printing error in the guarding chart which placed the arrow (left) for 1/2" on the clearance line instead of the danger line will be corrected. Comment is solicited on the advisability of changing ". .feed table" to ". . feed table" or workpiece in place. . See comment on (c)(1)(ii).

Present Standard	Latest ANSI Standard	Comments
1910.218 FORGING MACHINES	ANSI B24.1-1971 (R 1975) SAFETY REQUIREMENTS FOR FORGING 1. Scope This standard applies to all classes of power forging machinery both for impression-die and flat-die forging, including power-driven and gravity-drop hammers, mechanical and hydraulic forging presses, trimming presses, upsetters (or forging machines), forging rolls, ring rolling, and bolt-heading and rivet-making machines. Excluded from this standard are safety requirements for cold forging operations. 2. Definitions ANSI B24.1 lists machine definitions here for power-driven hammers, gravity hammers forging presses, trimming presses, upsetters high-energy-rate forging machines, and other equipment. 3. References ANSI B24.1 lists numerous ANSI standards and other publications here. 4. General Facility Requirement ANSI B24.1 lists here standards for: Working space Aisles Platforms and	1. Scope Information is requested on whether forging hammers, forging presses, trimming presses, upsetters, forging rolls and ring rolling, boltheading, and rivet making machines require individual coverage in this section of the standard, or whether some of these machines could be adequately covered by performance requirements for all machines. Comment is requested on the special hazards common only to forging machines.

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1 Power Transmission Equipment Lighting Cooling fans Shower baths and locker rooms Storage racks for dies and die blocks Facility inspections and maintenance General ventilation Noise	
(a) General requirements.		
(1) Use of lead. The safety requirements of this subparagraph apply to lead casts or other use of lead in the forge shop or die shop.	4.9 Use of Lead The following safety requirements apply to lead casts or other use of lead in the forge shop or die shop.	(a)(1) Use of Lead Comment is requested on what unique hazards are presented by the use of lead in forge and die shops as opposed to the use of lead generally.
(i) Thermostatic control of heating elements shall beprovided to maintain proper melting temperature and prevent overheating.	(1) Thermostatic control of heating elements shall be provided to maintain proper melting temperature and prevent overheating.	
(ii) Fixed or permanent lead pot installations shall be exhausted.	(2) Fixed or permanent lead post installations shall be exhausted.	
(iii) Portable units shall be used only in areas where good, general roomventilation is provided	(3) Portable units shall be used only in areas where good, general room ventilation is provided.	
(iv) Personal protective equipment (gloves, goggles, aprons, and other items) shall be worn.	(4) Personal protective equipment (gloves goggles, aprons, and other items) shall be be worn.	
(v) A covered container shall be provided to store dross skimmings.	(5) A covered container shall be provided to store dross skimmings.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(vi) Equipment shall be kept clean, particularly from accumulations of yellow lead oxide.	(6) Equipment shall be kept clean, particularly from accumulations of yellow lead oxide.	
	(7) Signs shall be posted in work areas prohibiting eating in the area.	
	(8) Regular medical evaluation shall be made to measure lead concentration in the body.	
	5. Personal Protective Equipment	
	ANSI B24.1 lists standards for eye, head, foot and, hearing protection and protective clothing.	
	6. Machinery and Equipment - General Requirements	
(2) Inspection and maintenance. It shall be the responsibility of the employer to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes:	6.1 Inspection and Maintenance It shall be the responsibility of the user to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes:	(a)(2) Inspection and Maintenance. Comments are requested concerning any suggested training and maintenance schedules which would relate to the safe operation of forging machines.
(i) Establishing periodic and regular maintenance safety checks and keeping records of these inspections.	(1) Establishing periodic and regular maintenance safety checks and keeping records of these inspections.	
(ii) Scheduling and recording inspection of guards and point of operation protection devices at regular intervals.	(2) Scheduling and recording inspection of guards and point-of-operation protection devices at frequent and regular intervals.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(iii) Training personnel for the proper inspection and maintenance of forging machinery and equipment.	(3) Training personnel for the proper inspection and maintenace of forging machinery and equipment.	
(iv) All overhead parts shall be fastened or protected in such a manner that they will not fly or fall in event of failure.	(4) Fastening or protecting all overhead parts in such a manner that they shall not fly off or fall in event of failure.	
	6.2 Training Operators shall be trained for their duties and be made fully aware of safety operating methods.	
(3) Hammers and presses.	7. Hammers - General Requirements	(a)(3)(i) Positioning Hammers. OSHA requests comments on whether positioning a hammer on its foundation without anchoring it will provide adequate safety.
(i) All hammers shall be positioned or installed in such a manner that they remain on or are anchored to foundations sufficient to support them according to applicable engineering standards.	All hammers shall be positioned or installed in such a manner that they remain on or are anchored to foundations sufficient to support them according to applicable engineering standards.	
(ii) All presses shall be installed in such a manner that they remain where they are positioned or they are anchored to foundations sufficient to support them according to applicable engineering standards.	7.1, 10.1 General Requirements for Presses All presses shall be installed in such a manner that they reamin where they are anchored to foundations sufficient to support them according to applicable engineering standards.	
(iii) Means shall be provided for disconnecting the power to the machine and for locking out or rendering cycle controls inoperable.	7.1, 10.1.1 Lockouts Means shall be provided for disconnecting the power to the machine and for locking out or rendering cycling controls inoperable.	(a)(3)(iii) Lockouts. It has been brought to OSHA's attention that lockout procedures are not practiced for some situations where employers feel that tagout is a better practice or where strict lockout requirements impose unreasonable demands on an operation.

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	OSHA requests any comments on the feasibility and safety value of the lockout paragraph. Examples are requested of alternative safety procedures which would provide adequate safety when power is disconnected.
	7.2 Stuck Forgings Stuck forgings should be removed after the ram is propped (See 7.3) and the machine made inoperable.	
(iv) The ram shall be blocked when dies are being changed or other work is being done on the hammer. Blocks or wedges shall be made of material the strength and construction of which should meet or exceed the specifications and dimensions shown in Table O-11.	7.3, 10.1.2 Blocking The ram shall be blocked when dies are being changed or other work is being done on the hammer. Blocks or wedges shall be made of material the strength and construction of which should meet or exceed the specifications and dimensions shown on Table 1.	
(v) Tongs shall be sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker shall be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used they should be inspected periodically to insure safe condition.	7.4, 10.1.3 Tongs Tongs should be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used, they should be inspected periodically to ensure safe condition.	

Present Standard

1910.218

TABLE O-11—STRENGTH AND DIMENSIONS FOR WOOD RAM PROPS

Size of timber, inches [1]	Square inches in cross section	Minimum allowable crushing strength parallel to grain, p.s.i.[2]	Maximum static load within short column range [3]	Safety factor	Maximum recommended weight of forging hammer for timber used	Maximum allowable length of timber, inches
4 x 4	16	5,000	80,000	10	8,000	44
6 x 6	36	5,000	180,000	10	18,000	66
8 x 8	64	5,000	320,000	10	32,000	88
10 x 10	100	5,000	500,000	10	50,000	100
12 x 12	144	5,000	720,000	10	72,000	132

[1] Actual dimension.
[2] Adapted from U.S. Department of Agriculture Technical Bulletin 479. Hardwoods recommended are those whose ultimate crushing strengths in compression parallel to grain are 5,000 p.s.i. (pounds per square inch) or greater.
[3] Slenderness ratio formula for short columns is $L/d=11$, where L=length of timber in inches and d=least dimension in inches; this ratio should not exceed 11.

Latest ANSI Standard

B24.1

Table 1

Strength and Dimensions for Wood Ram Props

Size of Timber, In.*	Square Inches in Cross Section	Minimum Allowable Crushing Strength Parallel to Grain, Psi	Maximum Static Load Within Short Column Range‡	Safety Factor	Maximum Recommended Weight of Forging Hammer for Timber Used	Maximum Allowable Length of Timber, In.
4 × 4	16	5000	80 000	10	8000	44
6 × 6	36	5000	180 000	10	18 000	66
8 × 8	64	5000	320 000	10	32 000	88
10 × 10	100	5000	500 000	10	50 000	100
12 × 12	144	5000	720 000	10	72 000	132

* Actual dimension.
† Adapted from U. S. Department of Agriculture Technical Bulletin 479. Hardwoods recommended are those whose ultimate crushing strengths in compression parallel to grain are 5000 psi (pounds per square inch) or greater.
‡ Slenderness ratio formula for short columns is $L/d = 11$, where L = length of timber in inches and d = least dimension in inches; this ratio should not exceed 11.

Comments

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(vi) Oil swabs, or scale removers, or other devices to remove scale shall be provided. These devices shall be long enough to enable a man to reach the full length of the die without placing his hand or arm between the dies.	7.6, 10.1.4 Oil Swabs and Scale Removers Oil swabs, or scale removers or other devices to remove scale shall be provided. These devices shall be long enough to enable a man to reach the full length of the die without placing his hand or arm between the dies.	
(vii) Material handling equipment shall be of adequate strength, size, and dimension to handle diesetting operations safely.	7.7, 10.1.5 Die Setting Material handling equipment shall be of adequate strength, size, and dimension to handle die setting operations safely.	
(viii) A scale guard of substantial construction shall be provided at the back of every hammer, so arranged as to stop flying scale.	7.9 Scale Guards A scale guard of substantial construction shall be provided at the back of every hammer, so arranged as to stop flying scale.	
(ix) A scale guard of substantial construction shall be provided at the back of every press, so arranged as to stop flying scale.	10.1.6 Scale Guard A scale guard of substantial construction shall be provided at the back of every press, so arranged as to stop flying scale.	
(b) Hammers, general		
(1) Keys. Die keys and shims shall be made from a grade of material that will not unduly crack or splinter, and should not project more than 2 inches in front and 4 inches in back of ram or die.	7.5 Keys Die keys and shims shall be made from a grade of material that will not unduly crack or splinter, and should not project more than 2 inches in front and 4 inches in back of ram or die.	
(2) Foot operated devices. All foot operated devices (i.e., treadles, pedals, bars, valves, and switches) shall be substantially and effectively protected from unintended operation.	7.8 Foot-Operated Devices All foot-operated devices (that is, treadles, pedals, bars, valves, and switches) shall be substantially and effectively protected from unintended operation.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(c) Presses All manually operated valves and switches shall be clearly identified and readily accessible.	10.1.7 Manually-Operated Controls All manually-operated valves and switches shall be clearly identified and readily accessible.	
(d) Power-driven hammers. (1) Safety cylinder head. Every steam or air hammer shall have a safety cylinder head to act as a cushion if the rod should break or pull out of the ram.	8. Power-Driven Hammers--General Requirements 8.1 Safety Cylinder Head Every steam or air hammer shall have a safety cylinder head to act as a cushion if the rod should break or pull out of the ram.	
(2) Shutoff valve. Steam hammers shall be provided with a quick closing emergency valve in the admission pipeline at a convenient location. This valve shall be closed and locked in the off position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed.	8.2 Shutoff Valve Steam hammers shall be provided with a quick closing emergency valve in the admission pipe line at a convenient location. This valve shall be closed and locked in the "off" position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed.	
(3) Cylinder draining. Steam hammers shall be provided with a means of cylinder draining, such as a self-draining arrangement or a quick-acting drain cock.	8.3 Cylinder Draining Steam hammers shall be provided with a means of cylinder draining. Two acceptable means are a self-draining arrangement or a quick-acting drain cock.	
(4) Pressure pipes. Steam or air piping shall conform to the specifications of American National Standard ANSI B31.1.0-1967, Power Piping with Addenda issued before April 28, 1971.	8.4 Pressure Pipes Steam or air piping shall conform to the specifications of American National Standard B31.1.0-1967.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(e) Gravity hammers.	9. Gravity Hammers	
(1) Air-lift hammers.	9.1 Air-Lift Hammers	
(i) Air-lift hammers shall have a safety cylinder head as required in paragraph (d)(1) of this section.	9.1.1 Safety Cylinder Air-lift hammers shall have a safety cylinder head as required in 8.1.	
(ii) Air-lift hammers shall have an air shutoff valve as required in paragraph (d)(2) of this section and should be conveniently located and distinctly marked for ease of identification.	9.1.2 Shutoff Valve Air-lift hammers shall have an air shutoff valve as required in 8.2 and should be marked for ease of identification.	
(iii) Air-lift hammers shall be provided with two drain cocks: one on main head cylinder, and one on clamp cylinder.	9.1.3 Cylinder Draining Air-lift hammers shall be provided with two drain cocks: one on main head cylinder, and one on clamp cylinder.	
(iv) Air piping shall conform to the specifications of the ANSI B31.1.0-1967, Power Piping with Addenda issued before April 28, 1971.	9.1.4 Pressure Pipes Air piping shall conform to the specification of American National Standard B31.1.0-1967.	
(2) Board drophammers.	9.2 Board Drop Hammers	
(i) A suitable enclosure shall be provided to prevent damaged or detached boards from falling. The board enclosure shall be securely fastened to the hammer.	9.2.1 Enclosure for Boards A suitable enclosure shall be provided to prevent damaged or detached boards from falling. The board enclosure shall be securely fastened to the hammer.	

Present Standard	Latest ANSI Standard	Comments
1910.218 (11) All major assemblies and fittings which can loosen and fall shall be properly secured in place.	B24.1	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(f) Forging presses.	10.2 Forging Presses	(f) Forging Presses (Die Change and Maintenance).
(1) Mechanical forging presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:	10.2.1 Mechanical Forging Presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:	OSHA requests comments on other training and work practice requirements which would improve this paragraph.
(i) The power to the press shall be locked out.	(1) The power to the press shall be locked out.	
(ii) The flywheel shall be at rest.	(2) The flywheel shall be at rest.	
(iii) The ram shall be blocked with a material the strength of which shall meet or exceed the specification or dimensions shown in Table O-11.	(3) The ram shall be blocked with a meterial the strength of which shall meet or exceed the specifications or dimensions shown in Table 1.	
(2) Hydraulic forging presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:	10.2.2 Hydraulic Forging Presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:	
(i) The hydraulic pumps and power apparatus shall be locked out.	(1) The hydraulic pumps and power apparatus shall be locked out.	
(ii) The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table O-11.	(2) The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table 1.	
(g) Trimming presses.	10.3 Trimming Presses	
(1) Hot trimming presses. The requirements of paragraph (f)(1) of this section shall also apply to hot trimming presses.	10.3.1 Hot Trimming Presses. (See 10.2.1)	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(2) Cold trimming presses. Cold trimming presses shall be safeguarded in accordance with Section 1910.217(c).	10.3.2 Cold Trimming Presses These presses shall be safeguarded in accordance with Section 5 of American National Standard B11.1-1971.	
(h) Upsetters.	11. Upsetters—General Requirements	
(1) General requirements. All upsetters shall be installed so that they remain on their supporting foundations.	All upsetters shall be installed so that they remain on their supporting foundations.	
(2) Lockouts. Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable.	11.2 Lockouts Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable.	
(3) Manually operated controls. All manually operated valves and switches shall be clearly identified and readily accessible.	11.2 Manually-Operated Controls All manually-operated valves and switches shall be clearly identified and readily accessible.	
(4) Tongs. Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used they should be inspected periodically to ensure safe condition.	11.3 Tongs Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used, they should be inspected periodically to ensure safe condition.	

Present Standard	Latest ANSI Standard	Comments
1910.218 (5) Changing dies. When dies are being changed, maintenance performed, or any work done on the machine, the power to the upsetter shall be locked out, and the flywheel shall be at rest.	B24.1 11.4 Procedures When dies are being changed, maintenance performed, or any work done on the machine, the following procedure shall be accomplished: (1) The power to the upsetter shall be locked out. (2) The flywheel shall be at rest. 12. Other Forging Equipment 12.1 Forging Rolls Rolls should be started in an open position and brought gradually closer until the stock reaches the right size. 12.2 Ring Rolling 12.2.1 Rolls Rolls should be inspected regularly for condition and alignment. 12.2.2 Operation Tongs must be clear of the mill when in motion. 12.2.3 Guards Transparent, shatterproof heat shields should be provided and strategically placed for protection of personnel in rolling operations.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
(i) Other forging equipment.		
(1) Boltheading. The provisions of paragraph (h) of this section shall apply to boltheading.	12.3 Bolt-Heading The provisions of this standard pertaining to upsetters (Sections 11 to 11.4) shall apply to bolt heading.	
(2) Rivet making. The provisions of paragraph (h) of this section shall apply to rivet making.	12.4 Rivet-Making The provisions of this standard pertaining to bolt-heading and upsetting shall apply to rivet-making.	
	13. Other Forge Facility Equipment	
	13.1 Key Drivers Key drivers should be inspected regularly for end-splitting or cracks, and personnel should be instructed in the proper method of use.	
	13.2 Cranes Cranes should be operated and maintained in accordance with manufacturer's instruction (American National Standard B30.2.0-1967).	
	13.3 Powered Industrial Trucks No persons should operate an industrial truck without special training or license (American National Standard B56.1-1969).	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1	
	13.3.1 Manipulators used in forging operations should be inspected regularly to see that they are able to handle the designated loads. Tracks or slides for manipulators should be kept free of dirt or materials that would hinder its smooth operation.	
(j) Other forge facility equipment.	13.4 Billet Shears	
(1) Billet shears. A positive-type lockout device for disconnecting the power to the shear shall be provided.	13.4.1 A positive-type lockout device for disconnecting the power to the shear shall be provided.	
	13.4.2 The maximum size and specification of material being sheared, as recommended by the manufacturer of the shear, should not be exceeded.	
	13.4.3 Effective point-of-operation guarding should be provided at both the feeding end and discharge end of the shear.	
(2) Saws. Every saw shall be provided with a guard of not less than one-eighth inch sheet metal positioned to stop flying sparks. Suitable means should be provided to trap sparks below the saw. A tank of water placed below the saw is also desirable.	13.5 Saws Every saw shall be provided with a guard of not less than one-eighth inch sheet metal positioned to stop flying sparks. Suitable means should be provided to trap sparks below the saw. A tank of water placed below the saw is also desirable.	
(3) Conveyors. Conveyor power transmission equipment shall be guarded in accordance with ANSI B20.1-1957, Safety Code for Conveyors, Cableways, and Related Equipment.	13.6 Conveyors Conveyor power transmission equipment shall be guarded in accordance with American National Standard B20.1-1957.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1 13.7 Heating Equipment 13.7.1 Control of Heat Exposure Control of heat exposure should be provided by such methods as: (1) Reflective shielding (2) Controlled openings (3) Evaporative cooling (4) Water jackets (5) Chain curtains 13.7.2 Combustion Safeguards Protection against dangerous accumulation of unburned mixtures of fuel and air within the furnace, caused by accidential burner-flame extinguishment or lack of automatic preventilation, should be provided. 13.7.3 Oil-Fired A lighting torch shall be provided for lighting oil-fired furnaces. 13.7.4 Gas-Fired A lighting torch shall be provided for lighting gas-fired furnaces.	

Present Standard	Latest ANSI Standard	Comments
1910.218	B24.1 13.8 Heat Treating Manufacturer's recommendations should be followed in the operation and maintenance of heat treat furnaces. 14. Cleaning and Finishing Equipment 14.1 Shot Blast The cleaning chamber shall have doors or guards to protect operators. The exhaust system to remove spent shot should be kept free of obstruction and leaks. 14.2 Chemical Fume hoods and other ventilating apparatus should be used with chemical baths for cleaning and pickling. (See American National Standard Allowable Concentrations of Toxic Dust and Gases, Z37 Series.) 14.3 Tumbling Tumbling barrels should be completely guarded with protective sound absorbing material. These guards should be interlocked with the power circuit so that the barrel will not operate unless the guard is in place.	
(4) Shot blast. The cleaning chamber shall have doors or guards to protect operators.		

Present Standard	Latest ANSI Standard	Comments
1910.218 (5) Grinding. Personal protective equipment shall be used in grinding operations, and equipment shall be used and maintained in accordance with ANSI B7.1-1970, Safety Code for the Use, Care, and Protection of Abrasive Wheels, and with §1910.215.	B24.1 14.4 Grinding Personal protective equipment shall be used in grinding operations, and equipment shall be used and maintained in accordance with American National Standard B7.1-1970.	

Present Standard	Latest ANSI Standard	Comments
1910.219 MECHANICAL POWER TRANSMISSION APPARATUS	American National Standard Safety Standard for Mechanical Power Transmission Apparatus B15.1-1972 The latest ANSI standard (B15.1-1972) is a performance standard with an appendix which is specification oriented. Selected provisions of the ANSI standard and its appendix are set forth next to the appropriate provision of §1910.219. The entire B15.1-1972 standard with appendix can be obtained through ANSI. 1. Scope 1.1 This standard provides for the protection of people from the motion hazards associated with equipment used in the mechanical transmission of power in industrial and commerical establishments such as factories, construction sites, and business establishments whose premises have limited accessibility to the general public. Installations to be guarded include sources of mechanical power, the associated and intermediate equipment and the driven machines up to, but excluding, the point of operation. This pertains to revolving oscillating, reciprocating, or other moving parts such as, but not limited to, actuators, backstops, belts, brakes, cams, chains, clutches, collars, compressors.	The appropriate definitions for this section are found in §1910.211(f). Comments are requested as to which machine elements constitute power transmission apparatus covered by §1910.219 and excluded from §1910.212. Belts and sheaves, chains and sprockets, and couplings and shafts are the most common types of power transmission apparatus. What other machine elements or combinations should be covered in this power transmission apparatus standard? Under what particular circumstances should machine elements, such as cams, clutches, collars, lead screws, etc. be covered in this standard?

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
	counterweights, couplings, cranks, eccentrics, engines, flywheels, gears, lead screws, motors, power cylinders, pumps, pulleys, shafting, sheaves, spindles, sprockets, turbines, and winches. A1.1 Scope. Mechanical Power Transmission Components are universal on all mechanical equipment. Exposure to turning or moving parts is obviously hazardous. Body or clothing contact with such equipment is certain to result in an accident or injury, or both. No employee, regardless of training, intelligence and intent can be 100 percent alert 100 percent of the time. An employee forced to work close to unprotected moving transmission parts of machinery is likely to be apprehensive, and almost certain to come in contact with such machine parts sooner or later. This standard, when applied conscientiously, is intended to provide definite protection from inadvertent contact.	
(a) General requirements. (1) This section covers all types and shapes of power-transmission belts, except the following when operating at two hundred and fifty (250) feet per minute or less:	A2. Motion Hazards A2.1 Mechanical Motion. All mechanical motion has some potential of being hazardous. Rotating members, reciprocating parts, linearly moving belts and chains, meshing gears, oscillating mechanisms, parts-in-shear and uncontrolled movement of failing parts are examples of the types of motion requiring protection. They are not peculiar to any one machine or industry, but are basic to mechanical devices.	(a)(1) Should systems such as timing belts and sheaves and chains and sprockets transmitting low horsepower or those containing enough slack or stretch to prevent injury be exempt from guarding requirements? If so, what parameters are recommended? Provide supporting data and information. Is 250 FPM a reasonable value to use as a break-off point?

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972 A2.2 Types of Mechanical Motion. A2.2.1 Rotating. Any rotating mechanism may be dangerous. Even smooth, slowly rotating shafting can grip clothing or hair, cause abrasions, or through mere contact, force a limb into a more dangerous position. Collars, cams, clutches, couplings, flywheels, exposed shaft ends, lead screws and transmission shafting are examples of common rotating mechanisms which are hazardous unless guarded. The danger increases when fasteners, projecting keys, lubricating devices, nicks, burrs, sharps edges, or screw threads are exposed. Shafts and hubs with projecting keys and set screws are typical. Other examples include couplings with bolt-heads projecting, non-circular hubs on gears, sprockets and pulleys, or keyseat set-screws, pulleys with spokes or arms, and shifting mechanisms for some clutches. A2.2.2 Reciprocating or Oscillating. Reciprocating and oscillating motions are hazardous because the back-and-forth motions may cause a person to be struck or caught in a pinch or shear point between fixed and moving objects. An example of this is the rear overhang of the reciprocating head of a shaper-type machine tool.	

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	A2.2.3 Linear or Transverse. In linear or transverse motion a hazard exists in being caught between the moving element and fixed guideways or a shear point between the moving element and a fixed structure. A2.2.4 Nip Points or Nip Areas. Nip points occur where belts, rope or cables pass over pulleys, where gears, chains, and sprockets mesh, and between in-running rolls. Such motion may nip, pinch, squeeze or entrap objects coming into contact.	
(i) Flat belts one (1) inch or less in width, (ii) Flat belts two (2) inches or less in width which are free from metal lacings or fasteners, (iii) Round belts one-half (1/2) inch or less in diameter; and (iv) Single strand V-belts, the width of which is thirteen thirty-second (13/32) inch or less. (2) Vetical and inclined belts (paragraphs (e)(3) and (4) of this section) if not more than two and one-half (2-1/2) inches wide and running at a speed of less than one thousand (1,000) feet per minute, and if free from metal lacings or fastenings may be guarded with a nip-point belt and pulley guard.		(a)(1)(i),(ii),(iii) FIM 76-26 exempted from guard requirements flat and round belts without metal fasteners or lacing located above the table top when used on light and medium duty sewing machines in apparel and light weight material manufacturing. Data and information is solicited concerning other uses of belts which do not present a hazard to employees.

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(3) For the Textile Industry, because of the presence of excessive deposits of lint, which constitute a serious fire hazard, the sides and face sections only of nip-point belt and pulley guards are required, provided the guard shall extend at least six (6) inches beyond the rim of the pulley on the in-running and off-running sides of the belt and at least two (2) inches away from the rim and face of the pulley in all other directions.		(a)(3) Variances 349 and 350 permit the use of knitting machines containing guards with 5-1/4 inch clearance to the rim of the pulley rather than the 6 inch requirement. What range of dimensions are recommended to accommodate existing knitting machines thus providing a safe operating environment?
(4) This section covers the principal features with which power transmission safeguards shall comply.		
(b) Prime-mover guards.		
(1) Flywheels. Flywheels located so that any part is seven (7) feet or less above floor or platform shall be guarded in accordance with the requirements of this subparagraph:		(b)(1) ANSI B15.1-1972 paragraph 9.1.1 requires guards for moving parts located less than 8 feet above the working surface and for in-running nip and shear points or moving projections located less than 9 feet above the working surface. Should paragraph (b)(1) be changed to agree with this ANSI standard? Data and information supporting your position should be provided.
(i) With an enclosure of sheet, perforated, or expanded metal, or woven wire;		
(ii) With guard rails placed not less than fifteen (15) inches nor more than twenty (20) inches from rim. When flywheel extends into pit or is within 12 inches of floor, a standard toeboard shall also be provided;		

Present Standard	Latest ANSI Standard	Comments
1910.219 (iii) When the upper rim of flywheel protrudes through a working floor, it shall be entirely enclosed or surrounded by a guardrail and toeboard. (iv) For flywheels with smooth rims five (5) feet or less in diameter, where the preceding methods cannot be applied, the following may be used: A disk attached to the flywheel in such manner as to cover the spokes of the wheel on the exposed side and present a smooth surface and edge, at the same time providing means for periodic inspection. An open space, not exceeding four (4) inches in width, may be left between the outside edge of the disk and the rim of the wheel if desired, to facilitate turning the wheel over. Where a disk is used, the keys or other dangerous projection not covered by disk shall be cut off or covered. This subdivision does not apply to flywheels with solid web centers. (v) Adjustable guard to be used for starting engine or for running adjustment may be provided at the flywheel of gas or oil engines. A slot opening for jack bar will be permitted. (vi) Wherever flywheels are above working areas, guards shall be installed having sufficient strength to hold the weight of the flywheel in the event of a shaft or wheel mounting failure.	B15.1-1972	

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(2) Cranks and connecting rods. Cranks and connecting rods, when exposed to contact shall be guarded in accordance with paragraphs (m) and (n) of this section, or by a guardrail as described in paragraph (o)(5) of this section.		
(3) Tail rods or extension piston rods. Tail rods or extension piston rods shall be guarded in accordance with paragraphs (m) and (o) of this section, or by a guardrail on sides and end, with a clearance of not less than fifteen (15) nor more than twenty (20) inches when rod is fully extended.		
(4) Governor balls. Governor balls six (6) feet or less from the floor or other working level, when exposed to contact, shall be provided with an enclosure extending to the top of the governor balls when at their highest position. The material used in the construction of this enclosure shall conform to paragraphs (m) and (o) of this section.		(b)(4) The comment referring to paragraph (b)(1) also is applicable to paragraph (b)(4).
(c) Shafting	A6. Line Shaft Equipment	
(1) Installation.	A6.1 Decrease in Use. It is probable that few new plants or operations are being set up with line shafting. Nevertheless, line shafting still is in use.	
(i) Each continuous line of shafting shall be secured in position against excessive endwide movement.		(c)(1)(i),(ii) Comment is requested on whether excessive endwise shaft movement creates a safety hazard? If so, to what

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(ii) Inclined and vertical shafts, particularly inclined idler shafts, shall be securely held in position against endwise thrust.	For the most part the requirements for guarding line shafts, pulleys, belts, etc., are provided for in the standard. Some additional recommendations apply and are included here and are adopted from the 1953 edition of this standard.	extent should this movement be limited and under what conditions or situations?
(2) Guarding horizontal shafting.		(c)(2),(3),(4) Except for the 7' height, wordage of these paragraphs is essentially identical to the BLS 1924 edition.
(i) All exposed parts of horizontal shafting seven (7) feet or less from floor or working platform, excepting runways used exclusively for oiling, or running adjustments, shall be protected by a stationary casing enclosing shafting completely or by a trough enclosing sides and top or sides and bottom of shafting as location requires.		What hazards are associated with present day state-of-the-art technology? Should there be the same height requirement for horizontal, vertical, and inclined shafts? Should that requirement be 7, 8 or 9 feet?
(ii) Shafting under bench machines shall be enclosed by a stationary casing, or by a trough at sides and top or sides and bottom, as location requires. The sides of the trough shall come within at least six (6) inches of the underside of table, or if shafting if located near floor within six (6) inches of floor. In every case the sides of trough shall extend at least two (2) inches beyond the shafting or protuberance.		Should runways used for oiling or making adjustments continue to be excepted?

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(3) Guarding vertical and inclined shafting. Vertical and inclined shafting seven (7) feet or less from floor or working platform, excepting maintenance runways, shall be enclosed with a stationary casing in accordance with requirements of paragraphs (m) and (o) of this section.		
(4) Projecting shaft ends.		
(i) Projecting shaft ends shall present a smooth edge and end and shall not project more than one-half the diameter of the shaft unless guarded by nonrotating caps or safety sleeves.		
(ii) Unused keyways shall be filled up or covered.		
(5) Power-transmission apparatus located in basements. All mechanical power transmission apparatus located in basements, towers, and rooms used exclusively for power transmission equipment shall be guarded in accordance with this section, except that the requirements for safeguarding belts, pulleys, and shafting need not be complied with when the following requirements are met:	9.1.3 Equipment may be considered to be guarded by location when in an enclosed area with a locked entrance. The area shall have either walls or a fence of a minimum height of 96 inches. Mechanical Power Transmission components shall be individually guarded in compliance with Section 8 unless the source of power to or within all prime movers is automatically shut down when the entrance is opened. Manual re-start will be required.	(c)(5) Maintenance personnel at times are required to work on operating machinery. Should they be permitted to work within "locked" power transmission rooms containing unguarded power-transmission components? Should a guard based on degree of hazard be considered for fully informed and experienced maintenance personnel? If so, to what extent should guards be used, i.e., in-running nip points, shear points, moving projections, etc?

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(i) The basement, tower, or room occupied by transmission equipment is locked against unauthorized entrance. (ii) The vertical clearance in passageways between the floor and power transmission beams, ceiling, or any other objects, is not less than five feet six inches (5 ft. 6 in.). (iii) The intensity of illumination conforms to the requirements of ANSI A11.1-1965 (R-1970). (iv) The footing is dry, firm, and level. (v) The route followed by the oiler is protected in such manner as to prevent accident. (d) Pulleys. (1) Guarding. Pulleys, any parts of which are seven (7) feet or less from the floor or working platform, shall be guarded in accordance with the standards specified in paragraphs (m) and (o) of this section. Pulleys serving as balance wheels (e.g., punch presses) on which the point of contact between belt and pulley is more than six feet six inches (6 ft. 6 in.) from the floor or platform may be guarded with a disk covering the spokes.		(d)(1) Should the horizontal distance from a hazard be considered in conjunction with the vertical height requirement to determine a safe distance for guard location? Data and information is requested indicating safe distance/height relationship with an appropriate method used to determine the parameters.

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(2) Location of Pulleys. (i) Unless the distance to the nearest fixed pulley, clutch, or hanger exceeds the width of the belt used, a guard shall be provided to prevent the belt from leaving the pulley on the side where insufficient clearance exists. (ii) Where there are overhanging pulleys on line, jack, or countershafts with no bearing between the pulley and the outer end of the shaft, a guide to prevent the belt from running off the pulley should be provided.	A6.2 Location of Pulleys. Unless the distance to the nearest fixed pulley, clutch or hanger exceeds the width of the belt used, a guard should be provided to prevent the belt from leaving the pulley on the side where insufficient clearance exists. Where there are over-hanging pulleys on a line, jack or counter shaft, with no bearing between the pulley and the outer end of the shaft, a guard to prevent the belt from running off the pulley should be provided. Pulleys with cracks, or pieces broken out of rims, should be taken out of service.	
(3) Broken pulleys. Pulleys with cracks, or pieces broken out of rims, shall not be used.		
(4) Pulley speeds. Pulleys intended to operate at rim speed in excess of manufacturers normal recommendations shall be specially designed and carefully balanced for the speed at which they are to operate.		
(5) Composition and wood pulleys. Composition or laminated wood pulley shall not be installed where they are subjected to influences detrimental to their structural composition.	A6.3 Special Pulleys. Composition or laminated wood pulleys should never be installed where they are subject to influences detrimental to their structural composition. Pulleys used where conditions are such as to produce active corrosion should be made of corrosion resisting materials.	

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(e) Belt, rope, and chain drives.		
(1) Horizontal belts and ropes.	A6.4 Horizontal Belts and Ropes. Horizontal overhead belts, above floor or platforms, should be guarded for their entire length under the following conditions:	(e)(1)(i) This paragraph addresses horizontal belt drives containing horizontal axes. How should horizontal belts containing vertical axes be guarded? How do the 15 inch and 42 inch height requirements relate to safety? Are these height requirements applicable to belts, ropes and chains which operate under a predetermined tension with a resultant small lateral deflection? Data and information on these matters is requested.
(i) Where both runs of horizontal belts are seven (7) feet or less from the floor level, the guard shall extend to at least fifteen (15) inches above the belt or to a standard height (see Table O-12), except that where both runs of a horizontal belt are 42 inches or less from the floor, the belt shall be fully enclosed in accordance with paragraphs (m) and (o) of this section.		
(ii) In powerplants or power-development rooms, a guardrail may be used in lieu of the guard required by subdivision (i) of this subparagraph.		(e)(1)(ii) Are there particular machine elements in powerplants or power-development rooms which should be guarded by means other than a guardrail? Should guardrails other than those specified in (o)(5) of this paragraph be permitted?
(2) Overhead horizontal belts.		
(i) Overhead horizontal belts, with lower parts seven (7) feet or less from the floor or platform, shall be guarded on sides and bottom in accordance with paragraph (o)(3) of this section.		

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(ii) Horizontal overhead belts more than seven (7) feet above floor or platform shall be guarded for their entire length under the following conditions:		(e)(2)(ii) The hazard associated with overhead belts flying off and subsequently hitting an employee is addressed. Should guarding of overhead belts be required even when the belts are not over passageways and workplaces if employees can be injured? Comments are being solicited in reference to this point.
(a) If located over passageways or work places and traveling 1,800 feet or more per minute.	A6.4.1 If located over passageways or workplaces.	Are the 1800 FPM, 10 feet and 8 inch parameters appropriate or can these values be replaced with a range or tolerance limit of values? If so, please recommend parameters.
(b) If center to center distance between pulleys is ten (10) feet or more.	A6.4.2 If center to center distance between pulleys is ten (10) feet or more.	
(c) If belt is eight (8) inches or more in width.	A6.4.3 If the belt is eight (8) inches or more in width.	
(iii) Where the upper and lower runs of horizontal belts are so located that passage of persons between them would be possible, the passage shall be either:		

Present Standard	Latest ANSI Standard	Comments
1910.219 (a) Completely barred by a guardrail or other barrier in accordance with paragraphs (m) and (o) of this section; or (b) Where passage is regarded as necessary, there shall be a platform over the lower run guarded on either side by a railing completely filled in with wire mesh or other filler, or by a solid barrier. The upper run shall be so guarded as to prevent contact therewith either by the worker or by objects carried by him.. In powerplants only the lower run of the belt need be guarded. (iv) Overhead chain and link belt drives are governed by the same rules as overhead horizontal belts and shall be guarded in the same manner as belts. (v) American or Continuous System rope drives so located that the rope (particularly the splice) cannot be constantly and conveniently observed, shall be equipped with a telltale device (preferably electric-bell type) that will give warning when rope begins to fray.	B15.1-1972.	(e)(2)(iii)(a) What other means of safeguarding can be considered as safe as a guardrail? (e)(2)(iii)(b) Are there any situations when the upper run should be guarded in powerplants? (e)(2)(v) Information is requested as to the extent of current usage of American and Continuous System rope drives, and as to any appropriate revision of this paragraph.

Present Standard	Latest ANSI Standard	Comments
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(3) Vertical and inclined belts (i) Vertical and inclined belts shall be enclosed by a guard conforming to standards in paragraphs (m) and (o) of this section. (ii) All guards for inclined belts shall be arranged in such a manner that a minimum clearance of seven (7) feet is maintained between belt and floor at any point outside of guard.		(e)(3) Should a slow speed and low horsepower exemption be considered? If so, what parameters should be used as the cut-off points? How does guarding vertical and inclined belts differ from guarding horizontal belts as far as safety hazards are concerned? What horizontal distance from a hazard can be considered safe? Under what conditions? Why? Should needle sewing machines be exempted from the requirements of this paragraph?
(4) Vertical belts. Vertical belts running over a lower pulley more than seven (7) feet above floor or platform shall be guarded at the bottom in the same manner as horizontal overhead belts, if conditions are as stated in subparagraphs (2)(ii)(a) and (c) of this paragraph.	A6.5 Vertical Belts. Vertical belts running over a lower pulley above floor or platform should be guarded at the bottom in the same manner as on overhead belts if conditions are such as stated above.	
(5) Cone-pulley belts. (i) The cone belt and pulley shall be equipped with a belt shifter so constructed as to adequately guard the nip point of the belt and pulley. If the frame of belt shifter does not adequately guard the nip point of the		(e)(5)(i) This paragraph requires guarding of the nip point of the belt and pulley to the top of the cone. The paragraph, as drafted, applies only to flat belts; therefore, what other types of belts should be covered?

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belt and pulley, the nip point shall be further protected by means of a vertical guard placed in front of the pulley and extending at least to the top of the largest step of the cone. (ii) If the belt is of the endless type or laced with rawhide laces, and belt shifter is not desired, the belt will be considered guarded if the nip point of the belt and pulley is protected by a nip point guard located in front of the cone extending at least to the top of the largest step of the cone, and formed to show the contour of the cone in order to give the nip point of the belt and pulley the maximum protection. (iii) If the cone is located less than 3 feet from the floor or working platform, the cone pulley and belt shall be guarded to a height of 3 feet regardless of whether the belt is endless or laced with rawhide. (6) Belt tighteners. (i) Suspended counterbalanced tighteners and all parts thereof shall be of substantial construction and securely fastened; the bearings shall be securely capped. Means must be provided to prevent tightener from falling, in case the belt breaks.		

Present Standard	Latest ANSI Standard	Comments
1910.219 (ii) Where suspended counterweights are used and not guarded by location, they shall be so encased as to prevent accident. (f) Gears, sprockets, and chains. (1) Gears. Gears shall be guarded in accordance with one of the following methods: (i) Be a complete enclosure; or (ii) Be a standard guard as described in paragraph (o) of this section, at least seven (7) feet high extending six (6) inches above the mesh point of the gears; or (iii) By a band guard covering the face of gear and having flanges extended inward beyond the root of the teeth on the exposed side or sides. Where any portion of the train of gears guarded by a band guard is less than six (6) feet from the floor a disk guard or a complete enclosure to the height of six (6) feet shall be required.	B15.1-1972	(f)(1),(2),(3) Should slow running and low horsepower gears and sprockets and those guarded by location be exempted? What parameters are suggested as the cutoff points?

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(2) Hand-operated gears. Subparagraph (1) of this paragraph does not apply to hand-operated gears used only to adjust machine parts and which do not continue to move after hand power is removed. However, the guarding of these gears is highly recommended.		
(3) Sprockets and chains. All sprocket wheels and chains shall be enclosed unless they are more than seven (7) feet above the floor or platform. When the drive extends over other machine or working areas, protection against falling shall be provided. This subparagraph does not apply to manually operated sprockets.		(f)(3) Variance 284 indicated that a guard was not necessary for a chain and sprocket arrangement in which the chain at 5-10 pounds of tension moved at 1.375 IPS. What limits with respect to tension, speed and horsepower should be used where there is no risk of injury to an employee?
(4) Openings for oiling. When frequent oiling must be done, openings with hinged or sliding self-closing covers shall be provided. All points not readily accessible shall have oil feed tubes if lubricant is to be added while machinery is in motion.		
(g) Guarding friction drives.		
The driving point of all friction drives when exposed to contact shall be guarded, all arm or spoke friction drives and all web friction drives with holes in the web shall be entirely enclosed, and all projecting belts on friction drives where exposed to contact shall be guarded.		

Present Standard	Latest ANSI Standard	Comments
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(h) Keys, setscrews, and other projections.		
(1) All projecting keys, setscrews, and other projections in revolving parts shall be removed or made flush or guarded by metal cover. This subparagraph does not apply to keys or setscrews within gear or sprocket casings or other enclosures, nor to keys, setscrews, or oilcups in hubs of pulleys less than twenty (20) inches in diameter where they are within the plane of the rim of the pulley.		(h)(1),(2) Since paragraph (d)(1) requires guarding of pulleys; keys, setscrews, or oilcups which are within the plane of the pulley would naturally be guarded. Therefore, what are the hazards associated with pulleys greater than 20 inches diameter?
(2) It is recommended, however, that no projecting setscrews or oilcups be used in any revolving pulley or part of machinery.		
(i) Collars and couplings.		
(1) Collars. All revolving collars, including split collars, shall be cylindrical, and screws or bolts used in collars shall not project beyond the largest periphery of the collar.		(i)(1),(2) To what extent do revolving components cause injuries? Provide examples of hazards involved and supporting statistical data to substantiate any injuries.
(2) Couplings. Shaft couplings shall be so constructed as to present no hazard from bolts, nuts, setscrews, or revolving surfaces. Bolts, nuts, and setscrews will, however, be permitted where they are covered with safety sleeves or where they are used parallel with the shafting and are countersunk or else do not extend beyond the flange of the coupling.		Data and information is required as to whether other than cylindrical collars and couplings are in use.

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(j) Bearings and facilities for oiling.		(j) What hazards are present when a bearing is lubricated during operation of a machine?
Self lubricating bearings are recommended and all drip cups and pans shall be securely fastened.		
(k) Guarding of clutches, cutoff couplings, and clutch pulleys.		
(1) Guards. Clutches, cutoff couplings, or clutch pulleys having projecting parts, where such clutches are located seven (7) feet or less above the floor or working platform, shall be enclosed by a stationary guard constructed in accordance with this section. A "U" type guard is permissible.		(k)(1) When "U" type guards are used, how long shall they extend beyond the revolving component?
(2) Engine rooms. In engine rooms a guardrail, preferably with toeboard, may be used instead of the guard required by subparagraph (1) of this paragraph, provided such a room is occupied only by engineroom attendants.		(k)(2) See comment on paragraph (c)(5).
(3) Bearings. A bearing support immediately adjacent to a friction clutch or cutoff coupling shall have self-lubricating bearings requiring attention at infrequent intervals.		(k)(3) When "U" type guards are used, what hazards are associated with bearings adjacent to the revolving component?

Present Standard	Latest ANSI Standard	Comments
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(1) Belt shifters, clutches, shippers, poles, perches, and fasteners.		
(1) Belt shifters.	A6.6 Belt Shifters.	(1)(1),(2),(3),(4) Since the following machine elements; belt shifters, clutches, shippers, poles, perches and fasteners, are an integral part of line shafting, data and information is requested on current usage.
(i) Tight and loose pulleys on all new installations made on or after August 31, 1971, shall be equipped with a permanent belt shifter provided with mechanical means to prevent belt from creeping from loose to tight pulley. It is recommended that old installations be changed to conform to this rule.	A6.6.1 Tight and loose pulleys should be equipped with a permanent belt shifter provided with mechanical means to prevent the belt from creeping from the loose to the tight pulley.	Comment is requested on hazards arising from any component of line shafting which may not be covered by the OSHA standard.
(ii) Belt shifter and clutch handles shall be rounded and be located as far as possible from danger of accidental contact, but within easy reach of the operator. Where belt shifters are not directly located over a machine or bench, the handles shall be cut off six feet six inches (6 ft. 6 in.) above floor level.	A6.6.2 Belt shifter and clutch handle should be rounded and located as far as possible from danger of accidential contact, but within easy reach of the operator. Where belt shifters are not directly located over a machine or bench, the handle should be cut off six feet - six inches above floor level.	
(iii) All belt and clutch shifters of the same type in each shop should move in the same direction to stop machines, i.e., either all right or all left. This does not apply to friction clutch or countershaft carrying two clutch pulleys with open and crossed belts, respectively. In this case the shifter handle has three positions and the	A6.6.3 All belt and clutch shifters of the same type in each shop should move in the same direction to stop machines, i.e., either all right or all left. NOTE: This does not apply to friction clutch on countershaft carrying two clutch pulleys with open and crossed belts, respectively. In this case the shifter handle has three	

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machine is at a standstill when clutch handle is in the neutral or center position.	positions and the machine is at a standstill when the clutch handle is in neutral or center position.	
(2) Belt shippers and shipper poles. The use of belt poles as substitutes for mechanical shifters is not recommended. Where necessity compels their use, they shall be of sufficient size to enable workmen to grasp them securely. (A two-inch (2 in.) diameter or 1-1/2 by 2 inches cross-section is suggested.) Poles shall be smooth and preferably of straight grain hardwood, such as ash or hickory. The edges of rectangular poles should be rounded. Poles should extend from the top of the pulley to within about forty (40) inches of floor or working platform.		
(3) Belt perches. Where loose pulleys or idlers are not practicable, belt perches in form of brackets, rollers, etc., shall be used to keep idle belts away from the shafts. Perches should be substantial and designed for the safe shifting of belts.	A6.7 Belt Perches. Where loose pulleys or idlers are not practicable, belt perches in the form of brackets, rollers, etc., should be used to keep idle belts away from the shafts. Perches should be substantial and designed for the safe shifting of belts.	
(4) Belt fasteners. Belts which of necessity must be shifted by hand and belts within seven (7) feet of the floor or working platform which are not guarded in accordance with this section shall not be fastened with metal in any case, nor with any other fastening which by construction or wear will constitute an accident hazard.		

Present Standard	Latest ANSI Standard	Comments
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(m) Standard guards—general requirements.		
(1) Materials.	7. Types of Guarding	(m)(1) Data and information is requested as to other materials which should be permitted or prohibited in the construction of guards.
(i) Standard conditions shall be secured by the use of the following materials. Expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe securely fastened to floor or to frame of machine.	7.1 The general types of guards include those listed below or combination thereof. 7.1.1 Enclosure. This type covers the majority of guards under this standard. They function to prevent access or physical contact by parts of the body to moving parts at all times by enclosing or shielding the hazard and to restrain broken parts from flying about. Enclosures are normally fixed; they may be built into the machine by design or securely attached to the machine. These include, but are not limited to, completely enclosed guards, "U" and trough guards, cylindrical caps. (See Section 8). 7.1.2 By Location. This type covers position of equipment which by its location does not normally present a hazard in operation or maintenance procedures. Where a hazard exists during maintenance, the equipment must be shut down and all power locked out or the equipment guarded in accordance with Section 9 of this standard.	Since particular materials should be considered in conjunction with specified guarding techniques, information is also requested as to special situations in which guards constructed of particular materials do not afford adequate protection to employees.
(2) Methods of manufacture.		
(i) Expanded metal, sheet or perforated metal, and wire mesh shall be securely fastened to frame by one of the following methods:		(m)(2) Comment is requested on the appropriateness of designing a guard to withstand a specified load or a predetermined deflection and on design parameters for each design characteristic.

Present Standard	Latest ANSI Standard	Comments
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(a) With rivets or bolts spaced not more than five (5) inches center to center. In case of expanded metal or wire mesh, metal strips or clips shall be used to form a washer for rivets or bolts. (b) By welding to frame every four (4) inches. (c) By weaving through channel or angle frame, or if No. 14 gage 3/4-inch mesh or heavier is used by bending entirely around rod frames. (d) Where openings in pipe railing are to be filled in with expanded metal, wire mesh or sheet metal, the filler material shall be made into panels with rolled edges or bound with "Y" or "U" edging of No. 24 gage or heavier sheet metal fastened to the panels with bolts or rivets spaced not more than five (5) inches center to center. The bound panels shall be fastened to the railing by sheet-metal clips spaced not more than five (5) inches center to center. (e) Diamond or square mesh made of crimped wire fastened into channels, angle or round-iron frames, may also be used as a filler in guards. Size of mesh shall correspond to Table O-12.	7.1.3 Rails and Fences. This type of limited protection covers railings and fences intended to restrict and warn against inadvertent access to dangerous areas or hazardous elements. If a railing or fence is less than 42 inches from such hazard, then guards or enclosures meeting other requirements in this standard shall be applied to the hazardous element. (See Section 10.) 7.1.3.1 If the area between the rail or fence and the hazardous element is used as a passageway, the hazardous elements must be guarded according to the requirements of Section 8 or 9.	

Present Standard	Latest ANSI Standard	Comments
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(ii) Where the design of guards requires filler material of greater area than 12 aquare feet, additional frame members shall be provided to maintain panel area within this limit.		
(iii) All joints of framework shall be made equivalent in strength to the material of the frame.		(m)(2)(iii) Since strength of a guard varies relative to the point of load application, should the design of frame joints be specified?
(n) Disk, shield, and "U" guards.		
(1) Disk guards. A disk guard shall consist of a sheet-metal disk not less than No. 22 gage fastened by "U" bolts or rivets to spokes of pulleys, flywheels, or gears. Where possibility of contact with sharp edges of the disk exists, the edge shall be rolled or wired. In all cases the nuts shall be provided with locknuts which shall be placed on the unexposed side of the wheel.		(n)(1),(2),(3) What other materials and fastening techniques should be allowed or prohibited? Information is solicited as to any methods of building guards so that they are part of the mechanical components and in such a manner as to provide employee safety.
(2) Shield guards.		
(i) A shield guard shall consist of a frame filled in with wire mesh, expanded, perforated, or sold sheet metal.		(n)(2) Should a relationship between size of opening and distance from hazard be established? If so, provide distances and supportive data for such a relationship.
(ii) If area of shield does not exceed six (6) square feet the wire mesh or expanded metal may be fastened in a framework of 3/8-inch solid rod, 3/4-inch by 1/8-inch angle iron or metal		

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construction of equivalent strength. Metal shields may have edges entirely rolled around a 3/8-inch solid iron rod.		
(3) "U" guards. A "U" guard consisting of a flat surface with edge members shall be designed to cover the under surface and lower edge of a belt, multiple chain, or rope drive. It shall be constructed of materials specified in Table O-12, and shall conform to the requirements of paragraphs (o)(3) and (4) of this section. Edges shall be smooth and, if size of guard requires, these edges shall be reinforced by rolling, wiring, or by binding with angle or flat iron.		(n)(3) Should "U" guards constructed in a manner different than specified in this paragraph be permitted?
(o) Approved materials.		
(1) Minimum requirements. The materials and dimensions specified in this paragraph shall apply to all guards, except horizontal overhead belts, rope, cable, or chain guards more than seven (7) feet above floor, or platform. (For the latter, see Table O-13.)	8. Requirements for Enclosures 8.1 The guard itself shall prevent inadvertent placing of any part of the body in, on or over edges of the guard where it might contact a moving part.	(o)(1) A structural analysis of the members listed within Section (o) indicate inconsistent strengths for the various members. Comments from engineers concerning a systems approach to design of guards is requested.
(i) Minimum dimensions of materials for the framework of all guards, except as noted in subdivision (i)(c) shall be angle iron 1 inch by 1 inch by 1/8 inch, metal pipe of 3/4 inch inside diameter or metal construction of equivalent strength.	8.2 Guards shall be constructed of expanded perforated or solid sheet metal, wire mesh, plastic or other material of equivalent or greater strength to meet requirements of 8.3 and 8.4. Such material shall be free from burrs or sharp edges of corners. Guards shall be securely fastened to the building or framework of the machine.	(o)(1)(i) Since paragraph (o)(1)(i)(c) relates to the size of the framework, should the exception also include this paragraph?

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	Table O-12 Comments and suggestions are requested as to changes in Table O-12. Program directive 100-52 permits use of polycarbonate, acrylic or other materials which provide equal or better protection. What other materials should be included and how should this table incorporate these materials? Should the tabulation be replaced with general guarding specifications; also, what parameters and criteria should be established?

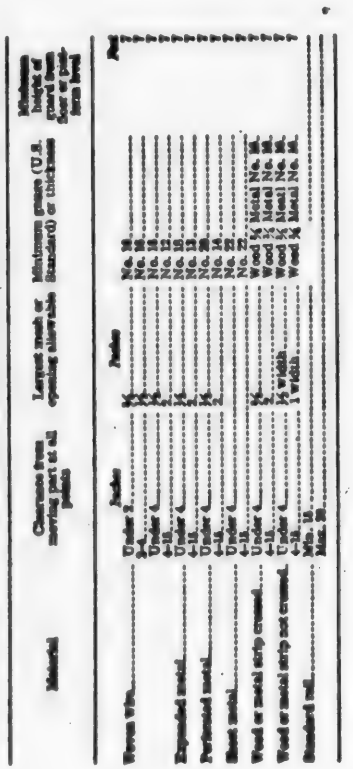

TABLE O-12—TABLE OF STANDARD MATERIALS AND DIMENSIONS

Material	Clearance from moving part at all points	Largest mesh or opening allowable	Minimum gauge (U.S. Standard) or thickness	Minimum height of guard from floor or platform level
	Inches	Inches		
Woven wire	Under 2	½	No. 20	6 ft.
	2 to under 6	½	No. 19	6 ft.
	6 to 15	1	No. 19	6 ft.
	Over 15 to under 36	2	No. 19	6 ft.
Expanded metal	Under 2	½	No. 20	6 ft.
	2 to under 6	½	No. 19	6 ft.
	6 to 15	1	No. 19	6 ft.
	Over 15 to under 36	2	No. 19	6 ft.
Perforated metal	Under 2	½	No. 20	6 ft.
	2 to under 6	½	No. 19	6 ft.
	6 to 15	1	No. 19	6 ft.
	Over 15 to under 36	2	No. 19	6 ft.
Sheet metal	Under 2	½	No. 20	6 ft.
	2 to under 6	½	No. 19	6 ft.
	6 to 15	1	No. 19	6 ft.
	Over 15 to under 36	2	No. 19	6 ft.
Wood or metal strip crossed	Under 2	½ width	No. 20	6 ft.
	2 to under 6	½ width	No. 19	6 ft.
	6 to 15	1 width	No. 19	6 ft.
	Over 15 to under 36	2 width	No. 19	6 ft.
Wood or metal strip not crossed	15 to 36	4	No. 19	6 ft.
	Over 36	4	No. 19	7 ft.
Standard rail	Min. 15	4	No. 19	3½ ft.
	Max. 36	4	No. 19	3½ ft.

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TABLE O-13—HORIZONTAL OVERHEAD BELTS, BOOMS, AND CHAINS 7 FEET OR MORE ABOVE FLOOR OR PLATFORM

	Width			
	From 10" to 14" inclusive	Over 14" to 24" inclusive	Over 24"	Material
STRINGERS				
Framework	1¼" x 1¼" x ¼"	2" x 2" x ¼"	2" x 2" x ¼"	Angle iron.
Filler (belt guards)	1¼" x ¼"	2" x ¼"	2" x ¼"	Flat iron.
Filler and vertical side member	No. 20 A. W. G.	No. 18 A. W. G.	No. A. W. G.	Solid sheet metal.
Filler supports	2" x ¼" flat iron	2" x ¼" flat iron	2½" x 2½" x ¼" angle	Flat and angle.
Guard supports	2" x ¼"	2" x ¼"	2½" x ¼"	Flat iron.
FASTENINGS				
Filler supports to frame work	(2) ½"	(2) ½"	(2) ½"	Rivets.
Filler bars to supports (belt guards)	(1) ½"	(1) ½"	(2) ½"	Flush rivets.
Filler to frame and supports (chain guards)	½" rivets spaced	6" centers on sides and 4" centers on bottom.		
Guard supports to frame work	(2) ½"	(2) ½"	(2) ½"	Rivets or bolts.
Guard and supports to overhead ceiling	1¼" x 2½" lag screws or ½" bolts.	1½" x 4" lag screws or ½" bolts.	½" x 6" lag screws or ½" bolts.	Lag screws or bolts.
GUARDS—GENERAL USE				
Width of guards	One-quarter wider than belt, rope, or chain drive.			
Spacing between filler supports	20' C. to C.	10' C. to C.	10' C. to C.	
Spacing between filler bars (belt guards)	2" apart	2½" apart	2" apart	
Spacing between guard supports	20' C. to C.	20' C. to C.	20' C. to C.	
OTHER THAN GUARD FILLERS PERMITTED				
Sheet metal between ends to chain guards	No. 22 A. W. G.	No. 18 A. W. G.	No. 18 A. W. G.	Solid or perforated.
Woven wire, 2" mesh	No. 12 A. W. G.	No. 10 A. W. G.	No. 8 A. W. G.	
CLEARANCE FROM OUTSIDE OF BELT, ROPE, OR CHAIN DRIVE TO GUARD				
Distance center to center of shafts	Up to 10' inclusive.	Over 10' to 20' inclusive.	Over 20' to 40' inclusive.	Over 40'.
Clearance from belt, or chain to guard	6"	10"	12"	15"

8.3 The enclosure and its supports shall be substantially designed so that an adult person leaning on, or falling against, the enclosure will not sustain an injury from the moving part.

Table O-13. Is this table applicable to present day state-of-the-art technology? If not, how should it be revised?

Should Table O-13 be expanded to include belts less than 10 inches wide?

Present Standard	Latest ANSI Standard	Comments
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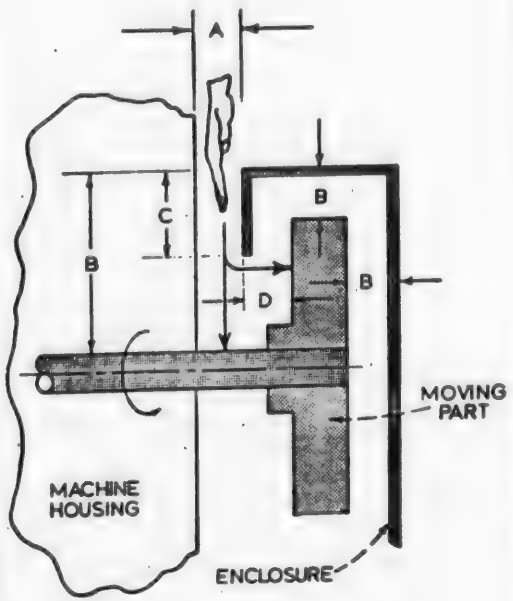
(a) All guards shall be rigidly braced every three (3) feet or fractional part of their height to some fixed part of machinery or building structure. Where guard is exposed to contact with moving equipment additional strength may be necessary.	8.4 Where there is a reasonable possibility of the moving part failing and causing injury, the enclosure shall be adequate to contain the broken parts. (See Appendix.)	(o)(1)(i)(a) Should bracing at intervals greater than 3 feet be allowed where a guard prevents contact with moving equipment?
(b) The framework for all guards fastened to floor or working platform and without other support or bracing shall consist of 1-1/2-inch by 1-1/2-inch by 1/8-inch angle iron, metal pipe of 1-1/2-inch inside diameter, or metal construction of equivalent strength. All rectangular guards shall have at least four upright frame members each of which shall be carried to the floor and be securely fastened thereto. Cylindrical guards shall have at least three supporting members carried to floor.	8.5 Enclosure openings shall conform to the attached chart; Fig. 1 and Fig. 2. 8.5.1 This chart shows the maximum size opening permitted in a guard in relation to the distance from the moving part which provides reasonable safety. Thus, 1/4 inch openings are permitted up to 1-1/2 inches from a moving part, 1/2 inch openings from 2-1/2 inches to 3-1/2 inch, and 7/8 inch openings from 6-1/2 inches to 7-1/2 inches, etc.	
(c) Guards thirty (30) inches or less in height and with a total surface area not in excess of ten (10) square feet may have a framework of 3/8-inch solid rod, 3/4 inch by 3/4-inch by 1/8-inch angle, or metal construction of equivalent strength. The filling material shall correspond to the requirements of Table O-12.	8.5.2 When the guard is partially open on the machine side as shown in Fig. 2, the distance to the moving part is a variable based on the opening A, as taken from the above chart, and shall be whichever is less of either the distance B or the distance C+D (the sum of the depth of the guard lip and the distance from the edge of the lip to the moving part). 8.6 Openings to permit lubrication, adjustment or inspection shall have hinged, sliding or bolted cover plates of any design that cannot be removed and will stay closed while the opening is not in use.	(o)(1)(i)(c) Data and information is requested on the hazards to which this paragraph is directed and on the appropriateness of specifications continued therein.

Present Standard	Latest ANSI Standard	Comments
1910.219 (ii) The specifications given in Table O-12 and subdivision (i) of this subparagraph are minimum requirements; where guards are exposed to unusual wear, deterioration or impact, heavier material and construction should be used to protect amply against the specific hazards involved.	B15.1-1972 9. Requirements for Guarding by Location 9.1 Equipment guarded by location shall by remoteness from the working areas remove the foreseeable risk of contact by persons. 9.1.1 To be guarded by location or position any moving part shall be at least 96 inches above the walkway, platform or workspace. Where the equipment has in-running nips, shear points or moving projections, it shall be a minimum of 108 inches above the pertinent floor, platform, or working level.	

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	ANSI Fig. 1. Comment is requested about the appropriateness of including this chart in the OSHA standard. Data and information is requested as to the appropriateness of this chart to guard construction.

Fig. 1
Distance to Moving Parts, "B" or "C+D," whichever is greater (inches)

Present Standard	Latest ANSI Standard	Comments
	 Fig. 2	

Comments	Latest ANSI Standard	Present Standard
	Fig. 3 Method of Measuring Opening "A" 	

Present Standard	Latest ANSI Standard	Comments
1910.219 (2) Wood guards. (i) Wood guards may be used in the woodworking and chemical industries, in industries where the presence of fumes or where manufacturing conditions would cause the rapid deterioration of metal guards; also in construction work and in locations outdoors where extreme cold or extreme heat make metal guards and railings undesirable. In all other industries, wood guards shall not be used. (ii) (a) Wood shall be sound, tough, and free from any loose knots. (b) Guards shall be made of planed lumber not less than one (1) inch rough board measure, and edges and corners rounded off. (c) Wood guards shall be securely fastened together with wood screws, hardwood dowel pins, bolts, or rivets.	B15.1-1972	(o)(2)(i) Under what other conditions should wooden guards be permitted? Are there any situations in particular industries where wooden guards should be prohibited? Variance 425 indicated that existing wooden guards with smooth painted exterior surfaces may continue to be used in place of the required metal types. (o)(2)(ii)(b) Comment is requested on allowing the use of plywood and other laminates less than 1 inch thick to fabricate guards. (o)(2)(ii)(c) Should other fastener techniques be considered? Equal strength requires determining the strength of metal guards in order to design a wooden guard. Information and data is solicited on the methods of determining criteria for wooden guards.

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(d) While no definite dimensions are given under this heading for framework or filler materials, wood guards shall be equal in strength and rigidity to metal guards specified in subparagraphs (1)(i) and (ii) of this paragraph and Table O-12.		
(e) For construction of standard wood railing, see subparagraph (5) of this paragraph.		
(3) Guards for horizontal overhead belts.		
(i) Guards for horizontal overhead belts shall run the entire length of the belt and follow the line of the pulley to the ceiling or be carried to the nearest wall, thus enclosing the belt effectively. Where belts are so located as to make it impracticable to carry the guard to wall or ceiling, construction of guard shall be such as to enclose completely the top and bottom runs of belts and the face of pulleys.		(o)(3)(i) If the purpose of a guard is to prevent a broken belt from hitting an employee, can a guard be constructed in another manner to accomplish this objective?
(ii) The guard and all its supporting members shall be securely fastened to wall or ceiling by gimlet-point lag screws or through bolts. In case of masonry construction, expansion bolts shall be used. The use of bolts placed horizontally through floor beams or ceiling rafters is recommended.		(o)(3)(ii) Are any of the design instructions within paragraph (o)(3)(ii) and (iii) related to employee safety? Should design techniques be stated or should performance oriented criteria be developed? What parameters should be considered in developing performance criteria?

Present Standard	Latest ANSI Standard	Comments
1910.219	B15.1-1972	
(iii) Suitable reinforcement shall be provided for the ceiling rafters or overhead floor beams, where such is necessary, to sustain safely the weight and stress likely to be imposed by the guard. The interior surface of all guards, by which is meant the surface of the guard with which a belt will come in contact, shall be smooth and free from all projections of any character, except where construction demands it; protruding shallow round-head rivets may be used. Overhead belt guards shall be at least one-quarter wider than belt which they protect, except that this clearance need not in any case exceed six (6) inches on each side. Overhead rope drive and block and roller-chain-drive guards shall be not less than six (6) inches wider than the drive on each side. In overhead silent chain-drive guards where the chain is held from lateral displacement on the sprockets, the side clearances required on drives of twenty (20) inch centers or under shall be not less than one-fourth inch from the nearest moving chain part, and on drive of over twenty (20) inch centers a minimum of one-half inch from the nearest moving chain part.		
(iv) Table O-13 gives the sizes of materials to be used and the general construction specifications of guards for belts ten (10) inches or more in		(o)(3)(iv) Selection of structural shapes depend on the individual guard design; therefore, what kind of criteria would be applicable to different guard designs?

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width. No material for overhead belt guards should be smaller than that specified in Table O-13 for belts ten (10) to fourteen (14) inches wide, even if the overhead belt is less than ten (10) inches in width. However, No. 20 gage sheet metal may be used as a filler on guards for belts less than ten (10) inches wide. Expanded metal, because of the sharp edges, should not be used as a filler in horizontal belt guards. (v) For clearance between guards and belts, ropes or chains of various center to center dimensions between the shafts, see bottom of Table O-13. (4) Guards for horizontal overhead rope and chain drives. Overhead-rope and chain-drive guard construction shall conform to the rules for overhead-belt guard construction of similar width, except that the filler material shall be of the solid type as shown in Table O-13, unless the fire hazard demands the use of open construction. A side guard member of the same solid filling material should be carried up in a vertical position two (2) inches above the level of the lower run of the rope or chain drive and two (2) inches within the periphery of the pulleys which the guard encloses thus forming a trough. These side edges with 1-1/2-inch by 1/4-inch flat steel, riveted to the filling material material at not greater than eight (8) inch centers; the reinforcing strip should		(o)(3)(v) The clearance dimensions in Table O-13 are not applicable to V-belts requiring specified amounts of tension. Data and information is solicited on appropriate dimensions. (o)(4) If the purpose of overhead guards is to confine a broken power transmission component, why should rope and chain guards be treated differently than overhead belt guards?

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be fastened or bolted to all guard supporting members with at least one 3/8-inch rivet or bolt at each intersection, and the ends should be secured to the ceiling with lag screws or bolts. The filling material guard and the filler supports by 3/16-inch rivets spaced on 4-inch centers. The width of the multiple drive shall be determined by measuring the distance from the outside of the first to the outside of the last rope or chain in the group accommodated by the pulley.		
(5) Guardrails and toeboards. (i) Guardrail shall be forty-two (42) inches in height, with midrail between top rail and floor. (ii) Posts shall be not more than eight (8) feet apart; they are to be permanent and substantial, smooth, and free from protruding nails, bolts, and splinters. If made of pipe, the post shall be one and one-fourth (1-1/4) inches inside diameter, or larger. If made of metal shapes or bars, their section shall be equal in strength to that of one and one-half (1-1/2) by three-sixteenths (3/16) inch angle iron. If made of wood, the post shall be two by four (2 x 4) inches or larger. The upper rail shall be two by four (2 x 4) inches, or two one by four (1 x 4) strips, one at the top and one at the side of posts. The midrail may be one by four (1 x 4) inches or more. The rails (metal shapes, metal bars, or	10. Requirements for Rails and Fences 10.1 Use of rails or fences shall be limited to cases where enclosure or guarding by location cannot be reasonably achieved. 10.1.1 Any such method of protection shall conform to ANSI: A12.1-1967 "Safety Requirements for Floor and Wall Openings, Railings and Toeboards" or latest revision thereof.	(o)(5) It has been suggested that the guardrail and toeboard requirements of this standard be made consistent with CFR Part 1910, Subpart D, except where a filler material (panel) is used. Comment is solicited on the appropriateness of this suggestion, and on specific Subpart D requirements which should not be included. Since the purpose of a guardrail is to provide safety by location, under what circumstances would the toeboard be necessary for employee protection?

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wood), should be on that side of the posts which gives the best protection and support. Where panels are fitted with expanded metal or wire mesh as noted in Table O-12 the middle rails may be omitted. Where guard is exposed to contact with moving equipment, additional strength may be necessary. (iii) Toeboards shall be four (4) inches or more in height, of wood, metal, or of metal grill not exceeding one (1) inch mesh. Toeboards at flywheel pits should preferably be placed as close to edge of the pit as possible.		
(p) Care of equipment. (1) General. All power-transmission equipment shall be inspected at intervals not exceeding 60 days and be kept in good working condition at all times.	A7. Operation and Maintenance A7.1 Inspection. All power transmission equipment should be inspection at regular intervals, such as every 60 days, and kept in good working condition at all times. Inspection items should include alignment, adjustment, rust, and excess lubricants of shafting, bearing and pulleys. Where explosive dusts, flammable vapors or liquids exist, the hazards of static sparks from shafting or belts should be eliminated. Cast iron pulleys should be tested at regular intervals for cracks in the rims or spokes.	(p)(1),(2),(3),(4),(5) It has been suggested that some sections of paragraph (p) relate only to property protection. Which of the requirements of this paragraph are relevant to employee safety?

Present Standard	Latest ANSI Standard	Comments
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(2) Shafting. (i) Shafting shall be kept in alignment, free from rust and excess oil or grease. (ii) Where explosives, explosive dusts, flammable vapors or flammable liquids exist, the hazard of static sparks from shafting shall be carefully considered. (3) Bearings. Bearings shall be kept in alignment and properly adjusted. (4) Hangers. Hangers shall be inspected to make certain that all supporting bolts and boxes are adjusted properly. (5) Pulleys. (i) Pulleys shall be kept in proper alignment to prevent belts from running off. (ii) One or both pulleys carrying a nonshifting belt should have crowned faces. (iii) Cast-iron pulleys should be tested frequently with a hammer to disclose cracks in rim or spokes. It should be borne in mind that the sound is usually the pulley. (iv) Split pulleys should be inspected to ascertain if all bolts holding together the sections of the pulley are tight.		

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(6) Care of belts. (i) Quarter-twist belts when installed without an idler can be used on drives running in one direction only. They will run off a pulley when direction of motion is reversed. (ii) Inspection shall be made of belts, lacings, and fasteners and such equipment kept in good repair. (iii) Where possible, dressing should not be applied when belt or rope is in motion; but, if this is necessary, it should be applied where belts or rope leave pulley, not where they approach. The same precautions apply to lubricating chains. In the case of V-belts, belt dressing is neither necessary nor advisable.	A7.3 Care of Belts. Quarter-twist belts when installed without an idler can be used on drives running in one direction only. They will run off a pulley when direction of motion is reversed. Regular inspection should be made of belts, lacings, and fasteners and such equipment kept in good repair. Belt dressing should not be applied when the belt or rope is in motion; but, if this is necessary, it should be applied where belts or ropes leave the pulleys, not where they approach. The same precautions apply to lubricating chains. In the case of V-belts, belt dressing is neither necessary nor advisable. The hazard of static electricity from belts should be carefully considered where explosives, explosive dusts, flammable vapors or flammable liquids exist. The National Fire Code, #33, Paragraph 507, prohibits the use of belts in spray booths unless totally enclosed.	(p)(6)(iii) Comments are requested concerning the hazard involved in the dressing of belts while they are in motion. OSHA has received a petition stating that belt dressing on V-belts is necessary because the dressing reduces both slippage and the operating temperature of belts. Comment on this matter is requested.
(7) Lubrication. The regular oilers shall wear tight-fitting clothing and should use cans with long spouts to keep their hands out of danger. Machinery shall be oiled when not in motion, wherever possible.	A7.2 Lubrication. Standard oiling practice recommends drip pans under all overhead equipment. Oilers should wear tight fitting clothing and use oil cans with long spouts. Machinery should never be in motion when being lubricated unless lubrication is automatic, or a long, gravity flow spout will enable the oiler to stand in the clear while carrying out his job.	

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